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Gap Management in Commercial Banks (The Case of Saudi Arabia)

إدارة الفجوة في البنوك التجارية

(حالة دراسية عن المملكة العربية السعودية)

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Dedication

الإهـــداء

إلى نهر العطاء الذي لا ينضب ...

إلى أمي وأبي ...

إلى الشمعة التي تنير لي دربي

إلى من سارت معي نحو الحلم خطوة بخطوة ...

إلى إيماني ... زوجتي

إلى الصغيرة التي الهمتني قبل أن ترى عينيها النور

إلى ابنتي ...

أهدي لكم هذا العمل مع كل الحب ...

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Abstract

Al Buali, Mahmoud Ibrahim. "Gap Management in Commercial Banks (The Case of Saudi Arabia)", Master of Finance and Banking Thesis, Yarmouk University, 2012 (Supervisors: Dr. Mona Al-Mwalla and Dr. Ziad Zurigat)

Gap management is one of the most important techniques of risk management in commercial banks. Gap management has received the greater attention over the last decade, because interest rate fluctuation has increased substantially. The importance of this study stems from the fact that stability of financial sector is essential for economic development, hence, from the importance of risk management in commercial banks

This study aims mainly to examine the relationship between gap management and the four main types of risk in commercial banks: (interest rate risk, credit risk, liquidity risk, and market risk) in addition to the effect of bank's size on gap management.

The sample of the study consists of Ten Saudi commercial banks listed in the Saudi Exchange Market, and the data were collected from the annual reports of these banks for the period between 2006 – 2010, and from monthly and annual reports of Saudi Arabian Monetary Agency (SAMA).

The results of the study exhibited that a significant positive relationship exists between gap management and interest rate risk and significant negative relationship between gap management and market risk. The results also revealed that no significant relationship exist between gap management and liquidity risk, credit risk and bank's size.

Finally, the study recommends that Saudi commercial banks should update the contents of their annual reports to include information about gap management, and maturities of sensitive rate assets and sensitive rate liabilities, in addition to the importance of having adequate information systems in Saudi commercial banks for measuring, controlling and reporting interest rate exposure.

Key Words: Gap Management, Banks' Risk Management, Interest Rate Risk, Credit Risk, Liquidity Risk, Market Risk, Banks in Saudi Arabia, Saudi Arabian Monetary Agency (SAMA)

Chapter One
Introduction

1-1 Preface

The health of the economy and the effectiveness of monetary policy depend on a sound financial system through the banking supervision. The banking supervision has become increasingly challenging because of great level of uncertainty and risk of financial crises in the economic environment. Risk management is one of the most important practices to be used especially in banks, for getting assurance about the reliability of the operations and procedures being followed within them. In today’s dynamic environment, nothing is constant but risk. Even banking is not deprived of risk and all banks are exposed to a variety of risks including credit risk, liquidity risk, foreign exchange risk, market risk and interest rate risk. An efficient risk management system is the need of time. Managing risk is one of the basic tasks to be done, once it has been identified and known. The risk and return are directly related to each other, which means that increasing one will subsequently increase the other and vice versa (Shafiq & Nasr, 2010)

As part of ongoing efforts to address issues of international banking supervision, the Basel Committee on Banking Supervision (BCBS) has been established at the end of 1974 by the central bank governors in ten countries. This committee provides a forum for regular cooperation on banking supervisory matters. It aims to enhance understanding of key supervisory issues and improve the quality of banking supervision worldwide. Although most member countries (and others) tend to implement the committee's polices, the committee does not have the authority to enforce recommendations (Tahtamouni, 2001).

In 1988, the commission decided to introduce a system for measuring capital referred to as the Basel Accord I of capital. This system provides for the implementation of a project to measure the credit risk in the framework of minimum capital with the level of 8% by the end of 1992. In 1997, Basel Committee on Banking Supervision has issued paper on the management of interest rate risk. In this, as in many other areas, sound controls are of crucial importance. It is essential that banks have a comprehensive risk management program in place that effectively identifies, measures, monitors and controls interest rate risk, and that is subject to appropriate board and senior management oversight. The new framework for capital adequacy in 2004 was the basis for the emergence of the so-called Basel II. The purpose of Basel II is to create an international standard that banking regulators can use when creating regulations about how much capital

banks need to put aside to guard against the types of financial and operational risks banks face, and these regulations is the capital adequacy (Khan & Ahmed, 2001).

The process of decision making to control risks of existence, stability and growth of a system through the dynamic balance of its assets and liabilities is called Asset Liability Management (ALM). (Prasad, 2008)

Many risk measurement and mitigation techniques have evolved in recent times. Some of these techniques are used to mitigate specific risks while others are meant to deal with overall risk of a firm. Gap analysis is one of these techniques which are used by well-established financial institutions (Khan & Ahmed, 2001).

Gap analysis is the most well-known Asset Liability Management techniques, normally used to mange interest rate risk. The gap "is the difference between interest sensitive assets and interest sensitive liabilities for a given time interval" (Hafferman, 1996).

Every Financial Institute irrespective to its size is generally exposed to market liquidity and interest rate risks. The failure of identifying the risks associated with business and taking timely measures of giving a sense of direction threatens the very existence of the institution. It is, therefore, important that the strategic decision makers of an organization should assume special care to the Balance Sheet Risk management and should insure that the structure of the

institute’s business and the level of Balance Sheet risk it assumes are effectively managed, appropriate policies and procedures are established to control the direction of the organization.

In the structure of banks, Balance Sheet has direct implications on profitability of banks especially in terms of Net Interest Margin, so it is absolute necessary to maintain compatible asset-liability structure to maintain liquidity, improve profitability and manage risk under acceptable limits. (Prasad, 2008)

A major part of the financial institutions is providing loans. To earn high profit, they make successful loans that are paid back in full and so have low credit risk. In reality, credit risk increases because of expected default of borrowers. Financial institutions also subject to other types of risk such as liquidity risk and market risk which have their effect on the performance of the banking business. So it is not surprising that banks managers become more concerned with risks their institutions face as result of greater interest rate fluctuations (Tahtamouni, 2001).

Commercial banks in Saudi Arabia are the most active sector in the economy and they play an active and dynamic role in the economic development. Therefore, attention were given to commercial banks' activities is highly important knowing that their success would with no doubt represent the success of the national economy (Ahmed & Khababa, 1999).

1-2 Objectives of the Study

The main objectives of this study are to:

1) Find out whether there is a relationship between the gap management and the four main types of risk: (market risk, liquidity risk, credit risk and interest rate risk) in the Saudi commercial banks.
2) Examine to what extent the bank size affects gap management in Saudi commercial banks.
3) Investigate the condition of each type of the four main risks (market risk, liquidity risk, credit risk and interest rate risk) in Saudi commercial banks.

1-3 Significance of the Study

Commercial banks have almost universally embarked upon an upgrading of their risk management and control systems because the banking sector plays a significant role in the national economy.

The results of this study are expected to revealed the effect of the four main types of risks in banking sector (market risk, liquidity risk, credit risk and interest rate risk) and the bank size on gap management, for a sample of Saudi banks.

This study therefore, is of importance, because gap management has become an increasingly important part of banking supervision and risk management over the past decade.

Furthermore, to the best of the researcher knowledge no similar study has been conducted in gap management in Saudi Arabia, and this study will be of great benefit for other researchers who are interested in this area.

1-4 Hypotheses of the Study

In order to achieve the objectives of this study, two main hypotheses are constructed to conclude a decision either by accepting or rejecting the availability of relationship between gap management and the four main types of risk in banking sector and bank's size.

The first hypothesis

There is a significant relationship between gap management and elements related to interest rate risk, credit risk, liquidity risk and market risk.

The Sub hypotheses

A. There is a significant positive relationship between interest rate risk and bank's gap management.

B. There is a significant positive relationship between credit risk and bank's gap management.

C. There is a significant positive relationship between liquidity risk and bank's gap management.

D. There is a significant positive relationship between market risk and bank's gap management.

The second hypothesis

There is a significant positive relationship between bank's size and banks gap management.

1-5 Limitations of the Study

It is important to point out that for the purpose of this study; there is a lack of information declared by the banks as there is no cooperation by the banks to disclose on some information needed by the researcher. This study focuses only on the Saudi domestic commercial banks listed in the Saudi Stock Exchange (Tadawul) and also the banks that established before 2006, however, all non-Saudi banks have been excluded from the sample of the study. Few studies have been made in this field, and especially those which studied the effects of the financial risks on gap management is another limitation, in addition to the weakness of some previous studies in reflecting the reality of what commercial banks do with managing the gap management.

1-6 Structure of the Study

In addition to this chapter, this study consists of five chapters. The next chapter presents the theoretical framework which describes the gap management and the main types of risks in Saudi commercial

banks. Then the relevant previous studies have been discussed in chapter three. Thereafter chapter four shows the research methodology. Chapter five presents the data analysis and interpretation of findings. The last chapter of this study summarizes the main study conclusions and recommendations.

Chapter Two

Theoretical Framework

2-1 Saudi Banking Sector

Saudi banks play an important role, not only as a financial intermediate serving depositors and borrowers and encouraging economic growth, but also as the largest Arab Banks. Saudi banks have expanded their activities, which are reflected by the growing assets during the last decade, and consequently, number of branches, number of ATMs. (Alber, 2010) The following table shows details of the incorporation year, capital and number of branches of Saudi commercial banks.

Table (2-1): Structure of commercial banks in Saudi Arabia

No	Bank	No of branches	Capital (million SR)	Incorporation year
1	Bank Albilad	78	3,000	2004
2	Arab National Bank	183	8,500	1979
3	Bank Aljazira	51	2,250	1975
4	Banque Saudi Fransi	82	9,040	1977

5	Saudi Hollandi Bank	44	3,307.5	1926
6	The Saudi Investment Bank	46	5,500	1976
7	Al Rajhi Bank	500	15,000	1957
8	Riyad Bank	244	15,000	1957
9	SABB	81	10,000	1978
10	Samba	66	9,000	1980
11	National Commercial Bank	291	15,000	1953
12	Alinma Bank	30	15,000	2006

Source: The web sites of the Saudi Commercial Banks

The Saudi banking system is quite unique compared to the traditional banking system. It is under strict regulation imposed by SAMA (Saudi Arabian Monetary Agency) and has several distinguished factors. Firstly, Saudi banks are unique in the fact that they provide a combination of conventional banking and Islamic banking. Secondly, the overwhelming depends on oil causes difficulties for domestic banks to diversify credit risk which consequently requires from banks to hold high levels of capital. Thirdly, the banks are funded by low cost demand deposits. The monetization of the Saudi banking system measured in terms of private credits to GDP was just 37 percent in 2008. The

banking system has displayed a high degree of stability and strong resilience to external shocks till 2007. The stability of the sector has been enhanced by its strict regulatory rules imposed by the Saudi Arabia Monetary Fund (SAMA). (Assaf, et al, 2010).

The evolutionary of the Saudi banking sector can be divided to the following phases (Ramady, 2010):

Early years 1940 – 1960's: The infancy period, characterized by money brokers, few foreign commercial banks and the beginnings of a formal central bank supervisory regime.

The 1970's: The adolescence period, Characterized by increasing direct regulation and SAMA supervision and establishment of government lending institutions, as well as the beginning of the policy of "Saudization" of foreign banks.

The 1980's: The young adulthood and coming of age, period of economic retrenchment and crisis management for banks concerning quality of their assets. Period of bank mergers and government support and introduction of government debts instruments.

The 1990's and period of maturity: Period witness the 1990 – 1991 Gulf War and shocks to the banking system, but strong SAMA interventionist support followed by economic boom. A period characterized by the use of ATM's, debt and credit cards, point of sales technology, and significant technology investment in sector.

2000 onwards: A period characterized by globalization pressures and new foreign bank competition, the expansion of the insurance sector and the emergence of Islamic financing, as well as the expansion of Saudi banks internationally.

In the beginning of 1990s the Saudi banking system had largely recovered from the difficulties of the mid-80s. Banks had expanded their branch network, introduced stronger management methods and new technologies, raised new capital, improved their profitability, and set aside large provisions for doubtful accounts. They were healthy and profitable and the 1990s augured well. However, with the invasion of Kuwait by Iraq in August 1990, the Saudi banking system faced its biggest challenge. The Gulf crisis fully tested the strength of the banking system and SAMA's capability as a central bank and banking supervisor.

Core banking income remains solid and has increased for many banks; despite some effects of global financial crisis of 2007/2008. Total assets continued to grow to reach SR 1,370 billion in 2009, compared with SR 655 billion in 2004. (Ramady, 2010)

A major factor affecting the experience of international and Saudi banks during the period of 2008 and 2009 was the sound performance of the Saudi banking sector, which continued to show strong profitability and growth during that period. The rate of return on average equity for

2008 was 20%, and for the nine months to September 2009 it stood at 16%. These solid returns in a period of turbulence and volatility are very positive and satisfactory. (El-Quqa, et al. 2006).

During 2010, commercial banks continued maintaining their strong financial position and confronting the after effects of global financial crisis that shook the banking sectors of industrial countries. The success achieved by Saudi banks in this regard was the combined result of fiscal measures taken to boost economic activity, government's guarantee to safeguard depositors' money, measures taken by SAMA to enhance banking liquidity and improve risk management systems at commercial banks, and banks' efficient management of their financial resources (SAMA report, 2011).

Commercial banks maintained their sound financial position during 2010 as they were in previous years. They showed a remarkable performance, strengthening their financial position (SAMA report, 2011), as illustrated in table (2-2).

Table (2-2): Consolidated Balance Sheet of Saudi Commercial Banks

Million Riyals

	2006	**2007**	**2008**	**2009**	**2010**
Assets					
Reserves	52,061	108,614	97,171	160,118	159,313
Foreign assets	129,786	147,712	153,986	210,918	193,127
Claims on Gov. and non-fin. public sector	158,218	181,613	241,986	182,324	214,333

enterprises					
Claims on the private sector	476,020	577,882	734,557	734,237	775,756
Claims on non-monetary financial institutions	837	1,429	911	1,365	1,946
Other assets	44,158	57,971	73,659	81,296	70,794
Total Assets	**861,088**	**1,075,221**	**1,302,271**	**1,370,258**	**1,415,267**
Liabilities					
Banking deposits	591,259	717,564	846,118	940,548	984,850
Foreign liabilities	59,199	105,213	112,466	99,683	94,706
Capital and reserves	79,947	106,026	131,822	163,642	178,025
Profits	34,665	30,264	29,928	26,830	26,120
Other liabilities	96,019	116,154	181,937	139,555	131,567
Total Liabilities	**861,088**	**1,075,221**	**1,302,271**	**1,370,258**	**1,415,267**

Source: Saudi Arabian Monetary Agency – 47th Annual Report

Commercial banks have been expanding their consumer loans since 1999. These loans rose from SR 38.4 billion at the end of 2001 to SR 198.8 billion at the end of 2010. This has been due to the service of SARIE that provides the feature of direct transfer of employees' salaries to their bank accounts, guaranteeing this type of loans (SAMA report, 2011); Table (2-3) provides a view of the components of these loans.

Table (2-3): Consumer and Credit Card Loans in Saudi Commercial Banks

Million Riyals

Year	Consumer Loans				Credit card Loans
	Real Estate	Motor Vehicles & Equipment	Others	Total	
2006	13,690.0	34.261.8	132,726.4	180,678.2	7,349.3
2007	14,136.9	37,588.2	126,682.8	178,407.8	9,251.1
2008	14,906.0	37,261.3	121,817.3	173,984.6	9,451.6
2009	17,860.1	38,134.5	123,923.6	179,918.2	8,621.2
2010	23,087.7	42,209	133,537.9	198,834.6	8,399.7

Source: Saudi Arabian Monetary Agency – 47th Annual Report

The following table (2-4) shows a review of banks' credit by economic activity during the period 2008 – 2010

Table (2-4): Banks Credit to the Private Sector by Economic Activity

Million Riyals

	2008		2009		2010	
	Amount	% Share	Amount	% Share	Amount	% Share
Agriculture & fishing	10,980	1.5	8,731	1.2	10,269	1.4
Manufacturing & Production	79,333	11.1	75,044	10.6	90,082	12.1
Mining & quarrying	4,265	0.6	5,337	0.8	5,818	0.8
Electricity, water & other utilities	10,629	1.5	13,365	1.9	19,243	2.6
Building & construction	54,371	7.6	44,741	6.3	55,644	7.5
Commerce	176,858	24.8	169,220	23.9	181,132	24.4
Transport & communications	37,814	5.3	38,415	5.4	42,992	5.8
Finance	16,812	2.4	21,258	3.0	17,756	2.4

Services	32.324	4.5	46,123	6.5	35,660	4.8
Other miscellaneous services	289,351	40.6	286,536	40.4	284,461	38.3
Total	**712,737**	**100**	**708,769**	**100**	**743,057**	**100**

Source: Saudi Arabian Monetary Agency – 47th Annual Report

Saudi Interbank Offered Rate (SIBOR) on Riyal deposits declined to its lowest levels in 2010 as SAMA continued to maintain the official reverse repo rate at low level. The decline in SIBOR was also in line with the general trend of interest rates on the international financial markets (SAMA report, 2011). The average interest rates for three-month deposits on Riyal and Dollar is illustrated in table (2-5)

Table (2-5): Interest Rates on Riyal and Dollar Deposits
(Average rates for Three-month deposits)

Year	Saudi Riyal Deposits	Dollar Deposits	Differential between Riyal & Dollar rate
2007	4.91	5.22	-0.32
2008	3.28	2.99	0.30
2009	0.91	0.74	0.18
2010	0.74	0.36	0.38

Source: Saudi Arabian Monetary Agency – 47th Annual Report

Saudi banking system is well on its way to the implementation of Basel II and we expect that banks will remain highly capitalized under the new standard. It is worth mentioning that SAMA's approach in applying Basel II Accord is an integrated one aimed at raising the level

of risk management in order to maintain the continued strength of the banking system. (El-Quqa, et al. 2006)

Saudi banks are well-capitalized by international standards, and showed an average Basel capital adequacy ratio of 16% in2008. It is noteworthy that almost all the capital of Saudi banks is Tier 1 capital. In addition, the quality of Saudi banks' assets remained strong, with non-performing loans (NPLs) amounting to 1.4% of total loans and advances at end-2008, while provisions coverage was at 153%. Banks continued to be highly liquid, with liquid assets representing an average of 34% of total customer deposits in 2008. (Al-Hamidy, 2010)

2-2 Risk management in commercial banks

The past decade has seen dramatic losses in the banking industry. Firms that had been performing well suddenly announced large losses due to credit exposures that turned sour, interest rate positions taken, or derivative exposures that may or may not have been assumed to hedge balance sheet risk. In response to this, commercial banks have almost universally embarked upon an upgrading of their risk management and control systems (Santomero, 1997).

Regardless of the sophistication of the measures, banks often distinguish between expected and unexpected losses. Expected losses are those that the bank knows with reasonable certainty will occur.

Unexpected losses are those associated with unforeseen events. Banks rely on their capital as a buffer to absorb such losses.

Risks are usually defined by the adverse impact on profitability of several distinct sources of uncertainty. While the types and degree of risks an organization may be exposed to depend upon a number of factors such as its size, complexity business activities, volume etc,

Banking is a business mostly associated with risk because of its large exposure to uncertainty and huge considerations. Risk management is one of the most important practices to be used especially in banks, for getting assurance about the reliability of the operations and procedures being followed. In today's dynamic environment, all banks are exposed to a large number of risks such as, credit risk, liquidity risk, foreign exchange risk, market risk and interest rate risk. (Al-Tammimi & Al-Mazrooie, 2007)

It is also realized recently that risk management is essentially more important to be carried upon in the financial sector than any other part of the economy. It makes more sense when it is known that the main purpose of the financial institutions is to maximize revenues and offer the maximum value to the shareholders by facilitating them with a variety of financial services especially by administrating risks (Al-Tammimi & Al-Mazrooie, 2007). The prime reason to adopt risk management practices is to avoid the probable failure in future. But, in realistic terms, risk management is clearly is not cost free. In fact, it is

expensive in both resources and in institutional disruption. But the cost of delaying or avoiding proper risk management can lead to some adverse results, like failure of a bank and possibly failure of a banking system (Meyer, 2000)

Risk management is discipline at the core of every financial institution and encompasses all the activities that affect its risk profile. It involves identification, measurement, monitoring and controlling risks to ensure that the individuals who take or manage risks clearly understand it, the organization's risk exposure is within the limits established by board of directors, risk taking decisions are in line with the business strategy and objectives, risk taking decisions are explicit and clear, and sufficient capital as a buffer is available to take risk.

A successful risk management system lie on the staffing of the risk management operation and the individuals, who were charged with this responsibility, must have a clear understanding of the role that risk management plays in maintaining a sound and financially strong position for these institutions (Haight, 1997)

2-2-1 Categories of Risk:

The comptroller's office in the United States (Haight, 1997), has identified the following nine risk categories:

1. Interest rate risk
2. Price risk
3. Foreign exchange risk

4. Liquidity risk
5. Credit risk
6. Reputation risk
7. Strategic risk
8. Transaction risk
9. Compliance risk

In addition the Federal Reserve Board has identified six risk types:

1. Credit risk
2. Market risk
3. Liquidity risk
4. Reputation risk
5. Legal risk
6. Operational risk

Many banking risks arise from the common cause of mismatching. If banks had perfectly matched assets and liabilities, then the only risk faced by a bank would be credit risk. This sort of matching, however, would be virtually impossible, and in any event would severely limit the banks' profit opportunities. Mismatching is an essential feature of banking business. As soon as maturities on assets exceed those of liabilities then liquidity risk arises. When interest rate terms on items on

either side of the balance sheet differ, then interest rate risk arises. Many of these risks are interrelated.

For this study our concern will be with Interest Rate Risk, Credit Risk, Liquidity Risk and Market Risk.

2-2-1-A Interest Rate Risk:

High volatility in oil and commodity prices and the unfolding credit crisis in United States and Europe have made financial institutions all around the world deeply concerned about the effects of movements in interest rates on their profitability and capital solvency ratios. (Nawalkha & Soto, 2009)

Interest rate risk is one of the crucial risks in banks. As a kind of systematic risk, it can be a threat to the stability of the financial system. (Entrop, et al, 2011). Interest rate risk is "related to the change in assets and liability returns and values caused by movements' in interest rate" (Hempel & Simonson, 1998) or "Interest rate risk is the exposure of a bank's financial condition to adverse movements in interest rates. (Basel Committee on Banking Supervision, 2001).

No financial manager can completely avoid one of the toughest and potentially most damaging forms of risk that all financial institutions must face – interest rate risk. When interest rates change in the financial marketplace, the source of revenue that financial institutions receive – especially interest income on loans and securities – and their

most important source of expenses – interest cost on borrowings - must also change. Moreover, changing market interest rates also change the market value of assets and liabilities, thereby changing each financial institution's net worth – that is, the value of owner's investment in the firm. Thus, changing market interest rates impact both the balance sheet and the statement of income and expenses of financial firms. (Rose & Hudgins, 2008)

The measurement of this risk is the ratio of interest sensitive assets to interest sensitive liabilities. Particularly, in periods of wide interest rate movements this ratio reflects this risk. The bank is welling to take in to consideration to be able to predict the future direction of interest rates, if a bank has ratio above 1.5. The banks returns will be lower if interest rate decline and higher if they increase. The unanticipated movement in interest rates can seriously affect the profitability of the bank; therefore, traditional focus of an asset-liability management group within a bank is the management of the interest rate risk (Hempel & Simonson, 1998).

The following section describes the primary forms of interest rate risk to which banks are typically exposed. These include re-pricing risk, yield curve risk, basis risk and optionality.

Sources of Interest Rate Risk:

1. **Re-pricing risk:** As financial intermediaries, banks encounter interest rate risk in several ways. The primary and most often discussed form of interest rate risk arises from timing differences in the maturity (for fixed rate) and re-pricing (form floating rate) of bank assets, liabilities and off-balance-sheet (OBS) positions. While such re-pricing mismatches are fundamental to the business of banking, they can expose a bank's income and underlying economic value to unanticipated fluctuations as interest rate vary. For instance, a bank that funded a long-term fixed rate loan with a short-term deposit could face a decline in both the future income arising from the position and its underlying value if interest rates increase. These declines arise because the cash flows on the loan are fixed over its lifetime, while the interest paid on the funding is variable, and increases after the short-term deposit matures (Basel Committee on Banking Supervision, 2001).
2. **Yield curve risk:** Re-pricing mismatches can also expose a bank to changes in the slope and shape of the yield curve. Yield curve risk arises when unanticipated shifts of the yield curve have adverse affects on a bank's income or underlying economic value. For instance, the underlying economic value of a long position in 10-year government bonds hedged by a short position in 5-year government notes could decline sharply if the yield curve steepens,

even if the position is hedged against parallel movements in the yield curve (Basel Committee on Banking Supervision, 2001).

3. **Basis risk:** Another important source of interest rate risk (commonly referred to as basis risk) arises from imperfect correlation in the adjustment of the rates earned and paid on different instruments with otherwise similar re-pricing characteristics. When interest rates change, these differences can give rise to unexpected changes in the cash flows and earnings spread between assets, liabilities and OBS instruments of similar maturities or re-pricing frequencies (Basel Committee on Banking Supervision, 2001).
4. **Optionality:** An additional and increasingly important source of interest rate risk arises from the options embedded in many bank assets, liabilities and OBS portfolios. Formally, an option provides the holder the right, but no the obligation, to buy, sell, or in some manner alter the cash flow of an instrument or financial contract. Options may be stand alone instruments such as exchange-traded options and over-the-counter (OTC) contracts, or they may be embedded within otherwise standard instruments. While banks use exchange-traded and OTC-options in both trading and non-trading accounts, instruments with embedded options are generally most important in non-trading activities. They include various types of bands and notes with call or put provisions, loans which give

borrowers the right to prepay balances, and various types of non-maturity deposit instruments which give depositors the right to withdraw funds at any time, often without any penalties. If not adequately managed, the asymmetrical payoff characteristics of instruments with optionality features can pose significant risk particularly to those who sell them, since the option held, both explicit and embedded, are generally exercised to the advantage of the holder and the disadvantage of the seller. Moreover, an increasing array of options can involve significant leverage which can magnify the influences (both negative and positive) of option positions on the financial condition of the firm (Basel Committee on Banking Supervision, 2001).

As the discussion above suggests, changes in interest rate can have adverse effects both on a bank's earning and its economic value. This has given rise to two separate, but complementary, perspective for assessing a bank's interest rate risk exposure.

Earning perspective: In the earning perspective, the focus of analysis is the impact of changes in interest rates on accrual or reported earnings. This is the traditional approach to interest rate risk assessment taken by many banks. Variation in earnings is an important focal point for interest rate risk analysis because reduced earnings or outright losses can threaten the financial stability of an institution by

undermining its capital adequacy and by reducing market confidence (Basel Committee on Banking Supervision, 2001).

Economic value perspective: Variation in market interest rates can also affect the economic value of a bank's assets, liabilities and OBS positions. Thus, the sensitivity of a bank's economic value to fluctuations in interest rates is a particularly important consideration of shareholders, management and supervisor alike. The economic value of an instrument represents an assessment of the present value of its expected net cash flows, discounted to reflect market rates. By extension, the economic value of a bank can be viewed as the present value of banks expected net cash flows, defined as the expected cash flows on assets minus the expected cash flows on liabilities plus the expected net cash flows on OBS positions. In this sense, the economic value perspective reflects one view of the sensitivity of the net worth of the bank to fluctuations in interest rates (Basel Committee on Banking Supervision, 2001).

Embedded losses: The earning and economic value perspective discussed thus far focus on how future changes in interest rates may affect a bank's financial performance. When evaluating the level of interest rate risk it is willing and able to assume, a bank should also consider the impact that past interest rates may have on future performance. In particular, instruments that are not marked to market may already contain embedded gains or losses due to past rate

movements. These gains or losses may be reflected over time in the bank's earnings. For example, a long term fixed rate loan entered into when interest rates were low and refunded more recently with liabilities bearing a higher rate of interest will, over its remaining life, represent a drain on the bank's resources. For this study, the first source which is the "Re-pricing Risk" will be studied (Basel Committee on Banking Supervision, 2001).

Interest Rate Risk Management:

The capacity of each institution to assume rate risk will vary with the extent of other risks (e.g. liquidity, credit risk, foreign exchange risk, investment risk) and its ability to absorb potential losses. As with other aspects of financial management, a trade-off exists between risk and return. Although a fully matched position eliminates interest rate risk, such a position may not be desirable for other sound business reasons. The objective of interest rate risk management need not necessarily be the complete elimination of exposure to changes in interest rates. Rather, it should be to manage the impact of interest rate changes within self-imposed limits set after careful consideration of a range of possible interest rate environments. (Bank of Jamaica, 2005)

The major challenge when estimating the interest rate risk of banks from the perspective of bank outsiders such as banking supervisors or external analysts is estimating the maturity structure of a

bank's assets and liabilities and the respective future cash flows arising from many different asset and liability positions. However, the detailed maturity and cash flow structure of a bank is usually not known to outsiders because there is no standardized access to these bank internal data. Instead, they typically have to rely on (regulatory) accounting-based data. These data show the amount of positions within certain time bands, the total outstanding amount of a given position is distributed among a number of time bands according to remaining time to maturity, re-pricing period and/or initial maturity. (Entrop, et al, 2011)

(Pinheiro & Ferreira, 2003) discussed managing of interest rate risk as follow:

In order to measure the effects of interest rate changes there are two different approaches commonly used, the re-pricing model (or funding gap) and the duration model.

In re-pricing model, assets and liabilities are separated according to their maturity buckets. In the duration gap model, a duration measure is calculated according to the characteristics of the assets and liabilities. Both models intend to capture the balance sheet gap (Assets-Liabilities).

The re-pricing model commonly used by practitioners, for its simplicity, can be misleading for three major reasons. The first problem is related to the use of book value. The second is related to over aggregation (a small number of buckets can fall into wrong

interpretation). The final problem is known as the runoff problem (no adjustment for periodic cash flows like interest and principle amortization). These problems are minimized using the duration model approach.

But (Simons, 1995) discussed the managing of interest rate risk in a different way:

One way to measure the direction and extent of the asset-liability mismatch is through gap analysis, which derives its name from the dollar gap that is the difference between the dollar amounts of rate-sensitive assets and rate-sensitive liabilities. A maturity gap is calculated for a given time period and includes all fixed-rate assets and liabilities that mature in that period and all floating-rate assets and liabilities that have interest rate reset dates in that period (Simons, 1995)

A bank that has a positive gap will see its interest income rise if market interest rates rise, since more assets than liabilities will exhibit an increase in the interest rate. Similarly, a bank with negative gap will be hurt by rising rates but will benefit from falling rates.

(Raghavan, 2003) found that there are two techniques in addition to the traditional Maturity Gap and the Duration Gap, these two techniques are: Simulation and Value at Risk for measurement of interest rate risk.

Value at Risk (VaR) is a method of assessing the market risk using standard statistical techniques. It is a statistical measure of risk exposure and measures the worst expected loss over a given time interval under normal market conditions at a given confidence level of say 95% or 99%. Thus VaR is simply a distribution of probable outcome of future losses that may occur on a portfolio. The actual result will not be known until the event take place. Till then it is a random variable whose outcome has been estimated.

Also with regards to the managing of the interest rate risk, the board of directors should approve the overall objectives, board strategies and polices that govern the interest rate risk of a bank. Other than approving the overall polices of the bank regarding interest rate risk the board of directors should ensure that the management takes the necessary actions to identify, measure, monitor, and control these risks (Khan & Ahmed, 2001).

2-2-1-B Credit Risk:

Credit risk is the oldest form of the risk in the financial markets. If credit can be defined as “nothing but the expectation of a sum of money within some limited time then credit risk is the chance that this expectation will not be met” (Caouette, et al, 1998), as defined by (Raghavan, 2003) as "the potential that a bank borrower / counter party fails to meet the obligations on agreed terms”. Also (Sathye et al, 2003) define credit risk in the following definition: “the potential for the financial

obligations of a contract not to be fulfilled". The real risk from credit is the deviation of portfolio performance from its expected value. Accordingly, credit risk is diversifiable, but difficult to eliminate completely. This is because a portion of the default risk may, in fact, result from the systematic risk outlined above. In addition, the idiosyncratic nature of some portion of these losses remains a problem for creditors in spite of the beneficial effect of diversification on total uncertainty. This is particularly true for banks that lend in local markets and ones that take on highly illiquid assets. In such cases, the credit risk is not easily transferred, and accurate estimates of loss are difficult to obtain (Santomero, 1997).

Credit Risk Management:

The objective of credit risk management is to minimize the risk and maximize bank's risk adjusted rate of return by assuming and maintaining credit exposure within the acceptable parameters (Raghavan, 2003).

The adverse selection is a concept related to problems in loan markets because of bad credit risk (Mishkin, 2000). Borrowers most likely to default are the ones who usually line up for loans. In other words, those who are most likely to produce an adverse outcome, are the most likely to be selected. And borrowers with very risky investment projects, in mind have much to gain if their projects are successful, and

they are the most eager to obtain loans. Clearly, however, they are the least desirable borrowers because of the greater possibility that they will be unable to pay back their loans.

According to (Hempel & Simonson, 1998), managing credit risk requires a clear credit philosophy in order to set management's priorities with respect to the marketplace. Banks' credit philosophies may range from an emphasis on consistent performance of the highest quality loan portfolio based on highly conservative underwriting standards to an emphasis on aggressive loan growth and market share with highly flexible underwriting standards. The banks' lending philosophy is established in a formal written loan policy.

According to (Hempel & Simonson, 1998), the credit philosophy and loan policy must be supported by and communicated with an appropriate credit culture. An effective credit culture exists when the actual behavior of every individual in the loan organization is closely aligned with management's priorities. Finally, credit culture is reflected in the loan organization's system and procedures that implement management's priorities and minimize errors and poor lending decisions.

Moral Hazard is "a problem in loan markets because borrowers may have incentives to engage in activities that are undesirable from the lenders' point of view" (Mishkin, 2000). In such situations, it is more likely that the lender will be exposed to the hazard of default. Once

borrowers have obtained a loan, they are more likely to invest in high risk investment projects, which that pay high returns to the borrowers if investment success. And high risk, however, makes it less likely that the loan will e paid back, and to be profitable, financial institutions must overcome the adverse selection and moral hazard problems that make loan defaults more likely to be less.

In presenting the approach employed to manage credit risk, we refer to the four-step process;

We begin with standards and reports. Each bank must apply a consistent evaluation and rating scheme to all its investment opportunities in order for credit decisions to be made in a consistent manner and for the result aggregate reporting of credit risk exposure to be meaningful. To facilitate this, a substantial degree of standardization of process and documentation is required. This has lead to standardized ratings across borrowers and a credit portfolio report that presents meaningful information on the overall quality of the credit portfolio

The form reported here is a single rating system where a single value is given to each loan, which relates to the borrower's underlying credit quality. At some institution, a dual system is in place where both the borrower and the credit facility are rated. In the later, attention centers on collateral and covenants, while in the former, the general credit worthiness of the borrower is measured. Some banks prefer such

a dual system, while others argue that it obscures the issue of recovery to separate the facility from the borrower in such manner. In any case, the reader will note that in the reported system all loans are rated using a single numerical scale ranging between 1 and 10. For each numerical category, a qualitative definition of the borrower and the loan's quality is offered and an analytic representation of the underlying financials of the borrower is presented. Such an approach, whither it is a single or a dual rating system allows the credit committee some comfort in its knowledge of loan asset quality at any moment of time. It requires only those new loan officers to be introduced to the system of loan ratings, through training and apprenticeship to achieve a standardization of ratings throughout the bank (Santomero, 1997).

Given these standards, the bank can report the quality of its loan portfolio at any time. Notice that total receivables, including loans, leases and commitments and derivatives, are reported in a single format. Assuming the adherence to standards, the entirety of the firm's credit quality is reported to senior management monthly via this reporting mechanism. Changes in this report from one period to another occur for two reasons, viz., loans have entered or exited the system, or the rating of individual loans has changed over the intervening time interval. The first reason is associated with standard loan turnover. Loans are repaid and new loans are made. The second cause for a change in the credit quality report is more substantive. Variations over

time indicate changes in loan quality and expected loan losses from the credit portfolio. In fact, credit quality reports should single changes in expected loan losses, if the rating system is meaningful.

For this type of credit quality report to be meaningful, all credits must be monitored, and reviewed periodically. It is, in fact, standards for all credits above some dollar volume to be reviewed on a quarterly or annual basis to ensure the accuracy of the rating associated with the lending facility. In addition, a martial change in the conditions associated either with the borrower or the facility itself, such as a change in the value of collateral, will trigger a re-evaluation. This process, therefore, results in a periodic but timely report card on the quality of the credit portfolio and its change from month to month (Santomero, 1997).

Generally accepted accounting principles require this monitoring. Commercial banks are required to have a loan loss reserve account (a contra-asset) which accurately represents the diminution in market value from known or estimated credit losses. As an industry, banks have generally sought estimates of expected loss using a two-step process, including default probability, and an estimate of loss given default. At least quarterly, the level of the reserve account is re-assessed, given the evidence of loss exposure driven directly from the credit quality report, and internal studies of loan migration through various quality ratings (Santomero, 1997).

Traditionally mutual funds and merchant banks have concerned themselves with such risk exposure, but the commercial banking sector has not. This appears to be changing in light of the recent substantial losses in real estate and similar losses in the not-too-distant past in petrochemicals. Accordingly, many banks are beginning to develop concentration reports, indicating industry composition of the loan portfolio.

For investment management community, concentrations generally benchmarked against some market indexes, and mutual funds will generally report not only the absolute percentage of their industry concentration, but also their positions relative to the board market indexes. Unfortunately, there is no comparable benchmark for the loan portfolio. Accordingly, firms must weigh the pros and cons of specialization and concentration by industry group and establish subjective limits on their overall exposure. This is generally done with both guidelines and limits set by senior management. Such a report is not the result of any analytical exercise to evaluate the potential downside loss, but rather a subjective evaluation of management's tolerance, based upon rather imprecise recollections of previous downturns.

Most organizations also will report concentration by individual company. To be meaningful, however, this exposure must be bank-wide and include all related affiliates. Both of these requirements are not

easily satisfied. For large institutions, a key relationship manager must be appointed to assure that overall bank exposure to a particular client is captured and monitored. This level of data accumulation is never easy, particularly across time zones. Nonetheless, such a relationship report is required to capture the disparate activity from many parts of the bank. Transaction with affiliated firms needs to be aggregated and maintained in close to real time (Santomero, 1997)

2-2-1-C Liquidity Risk:

Liquidity is the ability of a bank to fund increases in assets and meet obligations as they come due, without incurring unacceptable losses. The fundamental role of banks in the maturity transformation of short-term deposits into long-term loans makes banks inherently vulnerable to liquidity risk (Basel Committee on Banking Supervision, 2008). Liquidity risk can best be described as the risk of a funding crisis. While some would include the need to plan for growth and unexpected expansion of credit (Santomero, 1997). Also liquidity risk defined by (Simons, 1995) as “it arises when a large transaction in a particular instrument can have a noticeable impact on its market price”, while (Hefferman, 1996) defines it as “the risk of insufficient liquidity for normal operating requirement that is the ability of the bank to meet its liabilities when they fall due”.

Banks deposits generally have a much shorter contractual maturity than loans and liquidity management needs to provide a cushion to cover anticipated deposit withdrawals. Liquidity is the ability efficiently accommodates deposit as also reduction in liabilities and to fund the loan growth and possible funding of the off-balance sheet claims. The cash flows are placed in different time buckets based in future likely behavior of assets, liabilities and off-balance sheet items. Liquidity risk consists of Funding Risk, Time Risk and Call Risk (Raghavan, 2003)..

Funding Risk: It is the need to replace net out flows due to unanticipated withdrawals / nonrenewal of deposit.

Time Risk: It is the need to compensate for non-receipt of expected inflows of funds, i.e. performing assets turning into nonperforming assets.

Call Risk: It happens on account of crystallization of contingent liabilities and inability to undertake profitable business opportunities when desired

Liquidity Risk Strategy:

The liquidity risk strategy should enunciate specific policies on particular aspects of liquidity risk management, such as:

Composition of Assets and Liabilities: The strategy should outline the mix of assets and liabilities to maintain liquidity. Liquidity risk management and asset/liability management should be integrated to

avoid steep costs associated with having to rapidly reconfigure the asset liability profile from maximum profitability to increased liquidity.

Diversification and Stability of Liabilities: A funding concentration exists when a single decision or a single factor has the potential to result in a significant and sudden withdrawal of funds. Since such a situation could lead to an increased risk, the Board of Directors and senior management should specify guidance relating to funding sources and ensure that the bank have a diversified sources of funding day-to-day liquidity requirements. An institution would be more resilient to tight market liquidity conditions if its liabilities were derived from more stable sources.

Access to Inter-Bank Market: The inter-bank market can be important source of liquidity. However, the strategies should take into account the fact that in crisis situations access to inter-bank market could be difficult as well as costly.

The liquidity strategy must be documented in a liquidity policy, and communicated throughout the institution. The strategy should be evaluated periodically to ensure that it remains valid.

Liquidity Risk Management:

The essence of liquidity management problem arises from the fact that there is a trade-off between liquidity and profitability and mismatch between demand and supply of liquid assets. While the bank

has no control over the sources of funds (deposits), it can control the use of funds. As such, a bank's liquidity position is given priority in allocating funds. Given the opportunity cost of liquid funds, banks should make all profitable investments after having sufficient liquidity. Most banks now keep protective reserves on top of planned reserves. While the planned reserves are derived from either regulatory requirements or forecasts, the amount of the protective reserve depends on the management's attitude towards liquidity risk (Khan & Ahmed, 2001).

Liquidity management decisions have to be undertaken by considering all service areas and departments of the bank. Liquidity manager must keep track and coordinate the activities of all departments that raise and use funds in the bank. Decisions regarding the banks liquidity needs must be analyzed continuously to avoid both liquidity surplus and deficit. In particular, the liquidity manger should know in advance when large transactions (credit, deposits, and withdrawals) would take place to plan effectively for resulting liquidity surpluses or deficits.

A bank should establish a process of measuring and monitoring net funding requirements by assessing the bank's cash inflows and outflows. The bank's off-balance sheet commitments should also be considered. It is also important to assess the future funding needs of the bank. An important element of liquidity risk management is to estimate a

bank's liquidity needs. Several approaches have been developed to estimate the liquidity requirements of banks. These include the sources and uses of funds approach, the structure of funds approach, and the liquidity indicator approach. A maturity ladder is a useful device to compare cash inflows and outflows for different time periods. The deficit or surplus of net cash flows is a good indicator of liquidity shortfalls and excesses at different points in time (Khan & Ahmed, 2001).

Unexpected cash flows can arise from some other sources. As more and more banks are engaged in off-balance sheet activities, banks should also examine the cash flows on this account. For example, contingent liabilities used in these accounts (like financial guarantees and options) can represent substantial sources of outflows of funds. After identifying the liquidity requirements, a series of worse case scenarios can be analyze to estimate both possible bank specific shocks and economy-wide shock. The bank should have contingency funding plans of handling the liquidity needs during these crises. Possible responses to these shocks would include the speed with which assets can be liquidated and the sources of funds that that banks can use in the crisis. If the bank is dealing with foreign currency, it should have a measurement, monitoring and control system for liquidity in active currencies (Khan & Ahmed, 2001).

Banks should have adequate internal controls over its liquidity risk management process that should be a part of the overall system of

internal control. An effective system would create a strong control environment and have an adequate process of identifying and evaluating liquidity risk. It should have adequate information system that can produce regular independent reports and evaluations to review adherence to established policies and procedures. The internal audit function should also periodically review the liquidity management process to identify any problems or weaknesses for appropriate action by the management (Khan & Ahmed, 2001).

2-2-1-D Market Risk:

Market risk may be defined as “the possibility of loss to bank caused by the changes in the market variables” (Raghavan, 2003). Also, it is the risk that the value of on-/off-balance sheet positions will be adversely affected by movements in equity and interest rate markets, currency exchange rates and commodity prices. Market risk is the risk to the bank’s earnings and capital due to changes in the market level of interest rates or prices of securities, foreign exchange and equities, as well as the volatilities, of those prices (Raghavan, 2003). (Bessis, 2002) defines market risk more narrowly as the risk of loss during the time required to effect a transaction (liquidation period). This risk has two components, relating to volatility and liquidity. First, even though the liquidation period is relatively short, deviations can be large in a volatile market. Secondly, for instruments traded in markets with a low volume

of transactions, it may be difficult to sell without suffering large discounts.

Commercial banks may hold derivative contract to offset the market risk of a specific asset or liability or to reduce the overall market risk of its portfolio (Heffernan, 1996). The bank can be exposed to market risk in relation to debt securities (fixed and floating rate debt instruments, such as bonds), debt derivatives (forward rate agreements, future and option on debt instruments, interest and cross currency swaps, and forward foreign exchange positions) equities, equity derivatives (equity swaps, future and options on equity indices, options on futures, warrants) and currency transactions.

Market Risk Management:

Market risk management provides a comprehensive and dynamic frame work for measuring, monitoring and managing liquidity, interest rate, foreign exchange and equity as well as commodity price risk of a bank that needs to be closely integrated with the bank's business strategy.

Scenario analysis and stress testing is yet another tool used to assess areas of potential problems in given portfolio. Identification of future changes in economic conditions like – economic / industry overturns, market risk events, liquidity conditions etc that could have unfavorable effect on bank's portfolio is a condition precedent for

carrying out stress testing. As the underlying assumption keep changing from time to time, output of the test should be reviewed periodically as market risk management system should be responsive and sensitive to the happenings in the market (Raghavan, 2003).

2-3 Monitoring Risks:

Risk monitoring processes are established to evaluate the performance of bank's risk strategies / policies and procedures in achieving overall goals. Whether the monitoring function is performed by middle-office or it is a part of banks internal audit it is important that the monitoring function should be independent of units taking risk and report directly to the top management/board. (Report of State of Pakistan Bank, 2009)

The bank's risk level would be continuously monitored to ensure that it remains within the acceptable range. In addition to market risks the bank would monitor other risk limits to ensure that their levels are consistent with established policies, in all of these instances, it is critical that the monitoring system provides immediate feedback to management when actual risk levels must be within acceptable risk levels.

Banks should have an information system that is accurate, informative and timely to ensure dissemination of information to management to support compliance with board policy. Reporting of risk

measures should be regular and should clearly compare current exposures to policy limits. Further past forecast or risk estimates should be compared with actual results to identify any shortcomings in risk measurement techniques. The board on regular basis should review these reports (Report of State of Pakistan Bank, 2009).

2-4 Controlling Risks:

Careful monitoring of the banks risks will provide management with red flag whenever the risk levels are beyond those permitted as specified in risk management guidelines in these instances. Corrective measures should be under taken to ensure that the risks are brought back in the line with the guidelines. The integrity of the entire risk management system will depend on the strength of its reporting system and internal control processes (Mishkin, 2000)

Bank's internal control structure ensures the effectiveness of process relating to market risk management. Establishing and maintaining an effective system of controls including the enforcement of official lines of authority and appropriate segregation of duties, is one of the management's most important responsibilities. Persons responsible for risk monitoring and control procedures should be independent of the functions they review. Key elements of internal control process include

internal audit and review and an effective risk limit structure (State of Pakistan Bank, 2009).

There are several strategies available to control risks, such as gap analysis, and duration gap analysis. For example, if the bank has excessive exposure to interest rate risk, it can alter its gap position to conform within its guideline. Similarly, if the institution has excessive credit risk exposure it may choose to sell off assets or tighten its credit under writing requirements (Haight, 1997).

2-5 Gap Management:

Among the most popular interest rate hedging strategies in use today is interest sensitive gap management. Gap management techniques require management to perform an analysis of the maturities and re-pricing opportunities associated with interest bearing assets and with interest bearing liabilities. If management feels its institution excessively exposed to interest rate risk, it will try to match as closely as possible the volume of assets that can be re-priced as interest rates change with the volume of liabilities whose rates can also be adjusted with market conditions during the same time period (Rose & Hudgins, 2010).

This more directed focus on gap management, has received a grater attention over the last decade than in the past, because interest rate fluctuation has increased substantially.

The interest rate gap is a standard measure of the exposure to interest rate risk. There are two types of gaps (Bessis, 2002):

- The fixed interest rate gap for a given period: the difference between fixed rate assets and fixed rate liabilities.
- The variable interest rate gap: the difference between interest sensitive assets and interest sensitive liabilities

Gap analysis is the most well-known Asset-Liability Management (ALM) techniques, normally used to mange interest rate risk. The gap "is the difference between interest sensitive assets and liabilities for a given time interval" (Heffernan, 1996).

What happens when the amount of re-pricable assets does not equal the amount of re-pricable liabilities? Clearly, a gap then exists between these interest sensitive assets and interest sensitive liabilities. The gap is the portion of the balance sheet affected by interest rate risk.

If interest sensitive assets in each planning period exceed the volume of interest sensitive liabilities subject to re-pricing, the financial firm is said to have a positive gap and to be asset sensitive.

Asset sensitive (positive) gap = Interest sensitive assets – Interest sensitive liabilities > 0

In the opposite situation, suppose an interest sensitive bank's liabilities are larger than its interest sensitive assets. This bank then has a negative gap and is said to be liability sensitive (Rose & Hudgins, 2010).

Liability sensitive (negative) gap = Interest sensitive assets – Interest sensitive liabilities < 0

Gap analysis is a simple maturity/re-pricing schedules can be used to generate simple indicators of the interest rate risk sensitivity of both earnings and economic value to changing interest rates. When this approach is used to assess the interest rate risk of current earnings, it is typically referred to as gap analysis. Gap analysis was one of the first methods developed to measure a bank's interest rate risk exposure, and continues to be widely used by banks. To evaluate earnings exposure, interest rate sensitive liabilities in each time band are subtracted from the corresponding interest rate sensitive assets to produce a re-pricing gap for that time band. This gap can be multiplied by an assumed change in interest rates to yield an approximation of the change in net interest income that would result from such an interest rate movement. The size of the interest rate movement used in the analysis can be based on a verity of factors, including historical experience, simulation of potential future interest rate movements, and the judgment of bank management (Basel Committee on Banking Supervision, 2001).

Chapter Three
Literature Review

3-1 Introduction:

A number of previous studies have been conducted on gap management; other studies have discussed the four main types of risks that are related to the banking business: (interest rate risk, credit risk, liquidity risk, and market risk). In addition to related issues of determining the effects of these risks on gap management, which have been subjected to an extensive investigations by bankers, academics and policy makers. The following section reviews number of these studies which were subdivided into two segments: the first segment for the studies conducted in developed countries, and the second segment for the studies conducted in developing countries.

3-2 Studies in Developed Countries:

Bierwag and Kaufman (1985) conducted a study to describe a number of single-factor duration gap equations that may help financial institutions control the value of desired account. This study distinguishes between two methods calculating the institution's

sensitivity to unexpected interest rate changes. The two methods are: maturity gap and duration gap, the gap being the difference between the interest sensitivity measure of one or more asset accounts and that of one or more liability account. The duration gap generally provides a more accurate and useful measure of financial institution's interest sensitivity than the maturity gap. The results of this study can be summarized as follows:

1. If the institution believes it can accurately predict interest rate, it can attempt to achieve a return greater than current market yield, which is locked in when institution immunizes, by structuring its balance sheet to obtain a nonzero duration gap, in the other hand,
2. If the institution predicts that interest rates will raise more than the market expects, it should create a negative duration gap value for its target account, because in that case the value of the target account can be expected to increase.
3. If the institution's forecast turns out to be incorrect, the expected change in the target account will not be realized and may even be the wrong direction if the direction of actual change is the reverse of predicted change.

Brewer (1985) performed a study provides some insight into how financial future can be used as vehicles for reducing interest rate exposure, managing the gap position, and may add regulators in their

supervision of bank use of these instrument. On the other hand, he discussed the duration gap model, and stated that the duration gap model is a concept used to measure interest rate risk resulting from the effect of changes in interest on present values of cash flows and periodic principle payments of assets and liabilities. The researcher concluded that the recent increases and broad fluctuations in interest rates have led many banks to better understanding of interest rate risk and how to manage it. Moreover, he argues that, the use of gap management can be particularly important to bank funds management as a technique to manage interest rate risk.

He also postulates that bank can reduce the risk of loss due to unfavorable changes in interest rate by hedging its duration gap. Financial futures and the duration approach to gap management enable the bank to maintain a predetermined spread and to lock in an anticipated rate of return.

Kusy and Ziemba (1986) developed a multi-period stochastic linear programming model to study banks asset and liability management (ALM). The model includes essential institutional, legal, financial and bank-related policy considerations and their uncertainties. Kusy and Ziemba argue that in the light of uncertainties in cash flows, cost of funds and return on investments, a bank must managing banks

asset and liability to determine its optimal trade-off between risk, return and liquidity. The results indicate that:

1. ALM is theoretically and operationally superior to a corresponding deterministic linear programming model.
2. The qualitative and quantitative characteristics of the solutions are sensitive to the model's stochastic elements.
3. Comparing ALM with the stochastic decision tree (SDT) model, the result shows that, the ALM is computationally more tractable on realistically size problems than (SDT), and simulation results indicate that ALM generates superior policies.

Beck, et al (2000) curried out a study to examine whether the yield and duration of a portfolio of fixed income instruments are actually equal to the dollar-weighted average of the yields and duration of each individual asset, they directly integrate both funds management and capital adequacy with portfolio duration. The researchers stated that their approach not only uses duration matching to minimize interest rate risk but also for the rate of return on assets to exceed the rate of return on liabilities and the dollar value of the assets to differ from the dollar value of the liabilities used to fund those assets.

According to Beck, et al (2000), this approach provides a touch of realism to the process of bank management as opposed to dealing

with duration gap as a "stand alone" issue. Many examples do not address these realities and may therefore lead to misleading results.

Elijah, et al (2001) investigate the relationship between interest rate risk in U.S. banking organization and gap management through using the regression analysis, and they found that there is statistically significant relationship between interest rate risk and gap management.

Fooladi and Roberts (2004) have proposed two extensions of current practice in applying duration gaps for macro-hedging the equity position of a financial institution against interest rate risk. The first adjusts for the relative convexity of the asset and liability portfolio, which is the convexity gap. The researchers' contribution makes explicit the link to convexity as bond portfolio managers understand it. Further they derive a single hedging equation incorporating both first- and second- order condition.

The second extension shows how to modify duration gaps recognizing that banks and other financial institution hold assets and liabilities that are not default-free.

The model may be calibrated using benchmark parameters obtained from a careful study of financial institutions. It could then produce accurate estimates of possible hedging errors resulting from

ignoring the two duration macro-hedging extensions. Another approach could be use option-pricing models to estimate default probabilities rather than select the possibilities arbitrarily.

Diamond and Rajan (2005) analyze the liquidity risk, liquidity creation and financial fragility for commercial banks. However in their framework they suggested that asset and real assets were illiquid and their justifications were that users of the assets cannot be able to use their specialized human capital on behalf of others. Thus real assets can be sold or borrowed because its limited liability.

Jacobson, et al (2006) estimate a duration model to explain the survival time to default for borrowers in the business loan portfolio of a major Swedish bank over the period 1994-2000. The model takes both firm-specific characteristic, such as accounting ratio and payment behavior, loan related information, and the prevailing macroeconomic condition into account. The output gap, the yield curve and consumers' expectation of future economic development have significant explanatory power for the default risk of firm. They also compare their model with a frequently used model of firm default risk that condition only on firm-specific information.

This study provides a number of important insights:

1. Macroeconomic variables have significant explanatory power for firm default risk in addition to a number of common financial ratios.

2. A comparison of the researchers' with a benchmark model of firm default risk that conditions only on firm-specific information shows that while the latter model can make a reasonably account for the absolute level of risk.

Firm default risk increases almost monotonically over the survival of their loans. This increasing hazard provides additional support for the supposed existence of duration dependence.

Nawalkha and Soto (2009) put the following important questions: Are the managers of financial institutions ready for the small but increasingly significant risk of inflation in the near future, due to the unprecedented fiscal and monetary responses of the U.S. government to prevent an economic collapse? This study addresses this important issue by reviewing important findings in the area of interest rate risk management. The researchers discuss five classes of models in the fixed income literature that deal with hedging the risk of large, non-parallel yield curve shifts. These models are given as:

1. M-absolute / M-square models.

2. Duration vector / M-vector models.

3. Key rate duration models.

4. Principle component duration models.

5. Extensions of these models for fixed income derivatives, for valuing and hedging bonds, loans, demand deposits, and other fixed income instruments.

These models can be used for designing various hedging strategies such as portfolio immunization, bond index replication, duration gap management and contingent immunization, to protect against changes in the height, slope and curvature of yield curve.

They argue that the current regulatory models proposed by the U.S. Federal Reserve, the Office of Thrift Supervision and the Bank of International Settlements may understate the true interest rate risk exposure of financial institutions, if sharp increases in interest rates lead to higher default risk and quickening of the pace of deposit withdrawals.

The main conclusions of this study can be summarized as follows:

1. Powerful interest rate risk hedging models exist as alternatives to the traditional duration/convexity model.
2. The M-absolute model, using a single risk measure, can alone reduce the risk inherent in the traditional duration model by more than 50%.
3. Further gains in immunization performance can be made by using a vector of risk measures using the duration vector model and the M-vector model.

The hedging performance of the key rate duration models is similar to that of the duration vector and M-vector model, but it requires a large number of key rate durations to achieve this objective.

3-3 Studies in Developing Countries:

Duan and Sealey (1999) executed a study to compare options-based and conventional models -used to measure the duration gap for depositary institution- for measuring bank's interest rate risk exposure. They found that the options-based model combines the limited liability of equity with stochastic interest rates to provide a specific relationship between a bank's gap management and interest rate exposure of equity. Furthermore they found that the conventional model may over-estimate a bank's interest rate exposure. Hence, they conclude that the conventional model may lead banks to over-hedge their interest rate.

Tahtamouni, (2001) investigate the relationship between gap management and the four main types of risk in commercial banks (Market risk, Liquidity risk, Credit risk and Interest rate risk) in addition to the bank's size, to find their effects on fourteen Jordanian commercial banks listed in Amman Stock Exchange for the period between 1996 - 2000, also she analyze importance of size on bank's gap management.

She found that there is a significant positive relationship between gap management and interest rate risk, however, there is no statistical differences between gap management and liquidity risk, credit risk, market risk and bank's size.

Armeanu, et al (2008) provide an overview of interest rate risk and explains how this type of risk should be measured and managed within an asset-liability management. Then the study takes a short look at methods for measuring interest rate risk and after that explains and demonstrates how can be used Duration Gap Model for measuring interest rate risk in banks.

The researchers found that the market value of the equity remains unchanged due to the fact that a perfect immunization of balance sheet to the fluctuations of market interest rate was done (DGAP=0).

This study is distinguished from previous studies since it discussed the relationship and the effects of the four main types of risks in banking sector and the banks size on the gap management. However, Duan and Sealey's study (1999) and Elijah, et al study (2001) discussed only the relationship between gap management and interest rate risk. Moreover, as far as the available information for the researcher this is the first study which tries to relate the effects of the

four main types of risk together, in addition to the banks size on gap management in Saudi commercial banks.

From the discussion of the previous studies the researcher can see that the literature review which were conducted on gap management concept have been implemented and developed mostly in different developed countries, helped on improving this concept and these countries were the oldest in implementing the most suitable and correct scientific basis in gap management field. However, most of these studies concentrated on different approaches used to manage the effect of maximum one type of financial risk on gap management except Tahtamouni (2001) which discuss the relationship between Gap management and four types of risk in addition to the bank's size.

Chapter Four

Research Methodology

4-1 Introduction:

This chapter aims at presenting methodology used to investigate the gap management in Saudi commercial banks. However, it consists of the data collection methods, the sample of the study, the statistical tests used to analyze the collected data, and finally presenting the most important dependant and independent variables used to conduct the empirical model of the study.

4-2 Data Collection

As mentioned earlier the aims of this study is to find out whither there is a relationship between the gap management and the four main types of risk: (market risk, liquidity risk, credit risk and interest rate risk) in the Saudi commercial banks and to examine to what extent the bank size affects gap management in Saudi commercial banks. To achieve its objectives, the study used Panel Data, Cross-Sectional Data and Time-Series Data. Panel data analysis method distinguished from other standard methods of analysis with many characteristics that lead to get the most efficient and effective results which can be interpreted

economically and statistically. It will be presented in details in part (4-4) of this chapter.

Data are collected from the following secondary sources:

1. The Annual reports for the commercial banks under study (2006-2010).
2. The economic reports and bulletins for Saudi Arabian Monetary Agency (SAMA).
3. The monthly and annually reports of Saudi Stock Exchange (Tadawul).
4. Many previous researches, articles and papers related to the study as secondary sources of data.

4-3 Research Sample

The sample of the study consists of ten Saudi commercial banks selected from the twelve banks listed in the annual report of Saudi Arabian Monetary Agency (SAMA) for the period between 31st December 2006 and 31st December 2010. Two banks on SAMA list were excluded from the study; these banks are Alinma bank because of its newness where it was established in 2008 and National Commercial Bank because of unavailability of data. The selection criteria employed was the availability of data for these banks through the period of the

study. Moreover, the applications of these criteria results in the ten banks* that continuous have data for five years.

4-4 The Model and Statistical Techniques

The study used various statistical analysis methods to test all empirical models used in the current study. All empirical models are tested using Panel Data Analysis, where they are usually estimated by Fixed Effects and Random Effects techniques. The advantage of panel data analysis that it helps researchers to minimize the problems substantially that arise when there are omitted variable problems such as time and individual-specific variables. Moreover, panel data provides robust parameter estimations rather than time series and/or cross-sectional data **(Gujarati, 2004)**.

Panel data analysis are usually estimated by using either fixed effect which can be estimated by the Ordinary Least Squares method (OLS) or by using random effect that can be estimated by the Generalized Least Squares method (GLS). The fundamental difference between Fixed Effect Model and Random Effect Model is that if the Individuals and Time Specific Effects associated with the independent variables or not.

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* The following banks are included in this study: Riyad Bank, Bank Al Jazera, Saudi Investment Bank, Saudi Hollandi Bank, Saudi Fransi Bank, Saudi British Bank (SABB), Arab National Bank, Samba Financial Group, Al Rajhi Bank, Bank al Bilad.

The fixed effect model allows control for unobserved heterogeneity which describes individual specific effects that are not captured by observed variables. The term “fixed effects” is attributed to the idea that although the intercept may differ across individuals, each individual’s intercept does not vary over time. This model will be estimated by using OLS (Gujarati, 2004).

The fixed effect model:

$$\mathbf{Y_{it} = \alpha_i + \beta X_{it} + \varepsilon_{it}}$$

For this study’s variables the fixed effect model will be as follows:

$$\mathbf{Gap = \beta_0 + \beta_1 IRR + \beta_2 CR + \beta_3 LR + \beta_4 MR + \beta_5 BS + \varepsilon_0}$$

Where:

Gap = Gap amount

IRR = Interest rate risk

CR = Credit risk

LR = Liquidity risk

MR = Market risk

BS = Bank’s size

The random effects model will be estimated by the Generalized Least Square (GLS) technique. This is because the GLS technique takes into account the different correlation structure of the error term in the random effects model (Gujarati, 2004).

4-5 Model Variables

4-5-1 Dependant Variable

<u>Gap Amount:</u> The study uses data that was taken from the ten Saudi commercial banks annual reports from 2006 to 2010 to compute the gap amount which is expressed as "the amount of sensitive rate assets minus sensitive rate liabilities".

Following the procedures of (Hemple & Simonson, 1998) we compute the sensitive rate assets, as per the following formula:

Sensitive Rate Assets = TA - ∑ (TIP + FA + OA + CIH + DCB)

Where:

TA	=	Total Assets
TIP	=	Trade Investment, net
FA	=	Fixed Assets, net
OA	=	Other Assets
CIH	=	Cash in Hand
DCB	=	Deposits at Central Bank

The sensitive rate liabilities computed by using the following formula:

Sensitive Rate Liabilities = TL & SE - ∑ (CD + MA + SP + OL + TSE)

Where:

TL & SE	=	Total Liabilities and Shareholder Equity
CD	=	Customer Deposits

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MA	=	Margin Accounts
SP	=	Sundry Provisions
OL	=	Other Liabilities
TSE	=	Total Shareholding Equity

After that Gap is computed according to the following formula:

G = SRA – SRL

Where:

G	=	Gap
SRA	=	Sensitive Rate Assets
SRL	=	Sensitive Rate Liabilities

Then as per Rose and Hudgins (2008) the researcher calculates the Relative Interest Sensitive Gap as the following formula:

Relative IS GAP = IS GAP ÷ TA

Where:

Relative IS GAP	=	Relative Interest Sensitive Gap
IS GAP	=	Interest Sensitive Gap
TA	=	Total Assets

A relative interest sensitive gap greater than zero means the institution is asset sensitive, while a negative relative interest sensitive gap describes a liability sensitive financial firm.

4-5-2 Independent Variables

Interest Rate Risk: Changes in the market interest rate affects the returns and profitability of commercial banks. However, this effect depends on the nature of assets and liabilities. Moreover, the interest rate risk can be estimated according to Rose and Hudgins (2008) by using the following equation:

$$ISR = ISA \div ISL$$

Where:

ISR = Interest Sensitive Ratio

ISA = Interest Sensitive Assets

ISL = Interest Sensitive Liabilities

If ISR is less than 1 tells us we are looking at a liability sensitive institution while an ISR greater than unity points to an asset sensitive institution. Only if interest sensitive assets and liabilities are equal is a financial institution relatively insulated from interest rate risk (Rose & Hudgins, 2008). Table (4-1) explains this relationship between the gap amount, interest rate risk, and banks profitability.

Table (4-1): The relationship between gap amount, Interest rate risk and bank profit

Gap	Interest Rate Risk	Level of Interest	Bank Profit
Positive	Interest Sensitive Assets / Interest Sensitive Liabilities > 1	Increase Decrease	Increase Decrease
Negative	Interest Sensitive Assets / Interest Sensitive Liabilities < 1	Increase Decrease	Decrease Increase
Zero	Interest Sensitive Assets / Interest Sensitive Liabilities = 1	Increase Decrease	No Effect No Effect

From table (4-1), it can be noted that if the interest sensitive ratio more than 1, an increase in interest rate level will cause an increase in the banks profitability, and if interest rate level decreases this will cause a decrease in the banks profitability.

Moreover, if the interest sensitive ratio less than 1, an increase in the interest rate level will cause a decrease in the banks profitability, but if the level of interest rate decreases this will cause an increase in the banks profitability.

Finally, if the interest sensitive ratio equal 1, there will be no effect on banks profitability, regardless interest rate level increases or decreases.

Credit Risk: Credit risk defined as “nothing but the expectation of a sum of money within some limited time then credit risk is the chance that this expectation will not be met (Caouette, et al, 1998) and defined

also as "the potential that a bank borrower / counter party fails to meet the obligations on agreed terms" (Raghavan, 2003). The amount of the credit risk is calculated according to (Hemple, 1998) as per the following equation:

$$\textbf{Credit Risk} = \frac{\textbf{Provision for possible loan losses}}{\textbf{Loans \& Advances + Used Loans \& Advances}}$$

Credit risk is higher if the bank has more medium quality loans, but returns are usually higher too. Returns tend to be lower if the bank chooses to lower its credit risk by having a smaller portion of its assets in medium quality loans (Hemple & Simonson, 1998).

Liquidity Risk: Liquidity risk is defined as "risk of insufficient liquidity for normal operating requirements that is the ability of the bank to meet its liabilities when they fail due" (Heffeman, 1996).

According to (Hemple & Simonson, 1998) there are two equations to calculate the amount of the liquidity risk as follow:

$$\textbf{Liquidity risk} = \frac{\textbf{Short Term Investment}}{\textbf{Total Deposits}}$$

Unfortunately, because of difficulties in getting and calculating short term investment item from the annual reports, there is no choice available to me except using the second equation to get the required amounts of liquidity risk (Heffeman, 1996).

$$\textbf{Liquidity risk} = \frac{\textbf{Total investment portfolio, net + Treasury Bills}}{\textbf{Customer's Deposits + Banks \& Financial Deposits}}$$

Data concerning total deposits were taken directly from the annual reports of commercial banks, and the total deposits are calculated as customer's deposits plus banks and financial institutions deposits, however, it was difficult to get the requested data for short term investment, because it was not available in the annual reports directly. And for most banks the annual reports do not explain the maturities of the investment portfolio. To overcome this problem, the short term investment is found as follow:

Short Term Investment = $\sum$ (Trade Investment Portfolio + Treasury Bills)

Market Risk: Market risk may be defined as the possibility of loss to bank caused by the changes in the market variables (Raghavan, 2003). Market risk can be measured by the covariance between returns on risky assets (e.g. a corporation's common stock) and market portfolio divided by the variance of the market portfolio (Weston, 1983)

$$\textbf{Market Risk (Beta)} = \frac{\textbf{Covariance (Ra , Rm)}}{\textbf{Variance (Rm)}}$$

Where:

Ra = Return for the bank

Rm = Return for the market

By calculating beta, which measures the sensitivity of the stock price for commercial banks to the market index prices, the banks which have negative beta means that these banks moves against the market, and to explain this if there is an expectations to have bad events these banks will move against these expectations, and it is preferable to purchase stocks which have negative beta to offset the effect of bad expectations when it happen. But for the banks which have positive beta means that these banks moves with the market, and to explain this if there is an expectations to have good events these banks will move with these expectations, and these banks move with the market.

<u>Banks Size:</u> Another important independent variable in this study is banks size, this variable reflected through using Banks Total Assets values, which is available in the annual reports for the banks under study.

Chapter Five

Analysis and Results

5-1 Introduction

In the previous chapter, the researcher presented the research methodology used to analyze and test the study hypotheses to accomplish its objectives. Hence, the current chapter presents the descriptive statistics the variables used in the study. It also presents and discusses the estimation results of the empirical model using Panel Data Analysis which usually can be estimated either by Fixed Effect Model or Random Effect Model. Lagrange Multiplier Test (LM) and Hausman Test are applied between fixed and random effects models.

5-2 Descriptive Statistics

This section presents the most important descriptive statistics of all variables used in the study such as the Mean and Standard Deviation. The results of descriptive statistics are reported in table (5-1). These results show that:

Table (5-1): Descriptive analysis of study's variables

	Mean	Maximum	Minimum	Std. Dev.
GAP	-0.059	0.332	-0.885	0.302
Int. Rate Risk	1.189	3.868	1.580	0.870
Credit Risk	0.005	0.016	-0.001	0.004
Liquidity Risk	0.136	0.424	0.0004	0.102
Market Risk	0.833	1.830	-0.152	0.472
Bank Size	7.864	8.273	7.052	0.342

The Gap of Saudi banks has a mean value of -0.059; this percentage has ranged between -0.885 as a minimum value and 0.332 as a maximum value with standard deviation equal to 0.302. In general, Saudi banks have a negative gap and is said to be liability sensitive, which is mean that rising interest rates will lower the net interest margin of these banks, and falling interest rates will generate a higher interest margin and probably greater earnings as well. A negative gap is not necessarily a bad thing, because if interest rates decline, the bank's liabilities would get re-priced at lower interest rates and income would increase. However, if interest rates increase, liabilities would get re-priced at higher rates and income would decrease.

Table (5-2): Mean of Gap and interest rate risk for the sample

	Mean of GAP (2006-2010)	Mean of Interest Rate Risk (2006-2010)
Bank Albilad	-0.4711	0.2876
Arab National Bank	-0.1040	0.8956
Bank Aljazira	0.0615	1.1107
Saudi Fransi Bank	0.2552	1.6539
Saudi Hollandi Bank	0.0551	1.1159
Saudi Investment Bank	-0.1578	0.7684
Alrajhi Bank	-0.2019	0.6954
Riyad Bank	0.1534	1.3619
SABB	0.0981	1.1876
SAMBA	-0.0957	0.8433

It also shows that the mean of interest rate risk in Saudi banking sector is 1.189, with standard deviation equal to 0.870. The interest rate risk has ranged between 3.868 as maximum percentage and 1.580 as a minimum percentage. These figures present that the Saudi banks are asset sensitive because the interest rate risk greater than zero. This result inconsistent with the previous result that is the Saudi banks have negative gap (-0.059) which means liability sensitive, but table (5-2) shows that 50% of the studied banks are asset sensitive banks and 50% of them are liability sensitive.

Furthermore, we can observe that the credit risk of Saudi banks has a mean value of 0.005 with standard deviation of 0.0004, the maximum value of credit risk in Saudi bank is 0.016 and the minimum value is -0.001. This result shows that the Saudi banks are in a very good condition according to this risk. This good condition of the credit risk in Saudi banks due to screening and monitoring, establishment of long-term customer relationships, loan commitments, collateral, compensating balance requirements, and credit rationing.

It also presents that the mean of the liquidity risk is equal to 0.136 with standard deviation 0.102. The liquidity risk shows a high deviation in its observations with minimum value of 0.0004 and maximum value of 0.424. Because of banks deposits have a much shorter contractual maturity than loans and liquidity management needs to provide a cushion to cover anticipated deposit withdrawals, this result shows that the Saudi banks are able efficiently to accommodate deposit as also reduction in liabilities and to fund the loan growth and possible funding of the off-balance sheet claims.

Table (5-1) shows also that the market risk's mean is equal to 0.833 with standard deviation equal to 0.472, this means that the Saudi banks moves with the market because they have a possessive beta-means, to explain this if there is an expectation to have good events these banks will move with this expectation and these banks moves

with the market. The maximum value of market risk in Saudi banks is 1.830 and the minimum value is -0.152.

The last result from table (5-1) presents that the mean of the size of Saudi banks is equal to 7.864 with standard deviation equal to 0.342. The sizes of Saudi banks are closed to each other where they are ranged between 8.273 as a maximum value and 7.052 as a minimum value.

5-3 Multicollinearity Test between the Variables

Correlation matrix is a technique for detecting multicollinearity was used in this study. Table (5-3) displays the correlations among the explanatory variables for the full sample. This enables us to find out if there is a linear correlation between the independent variables, which is one of the conditions of the regression. Examination of the correlation matrix indicates that a high level of correlation is not found between any two of the independent variables, which is confirms the absence of the multicollinearity problem.

Table (5-3): Correlation Matrix

	Int. Rate Risk	Credit Risk	Liquidity Risk	Market Risk	Bank Size
Int. Rate Risk	1				
Credit Risk	-0.2751	1			
Liquidity Risk	-0.1437	-0.3371	1		
Market Risk	-0.1410	-0.1535	0.1574	1	
Bank Size	0.4670	-0.3404	0.0321	0.0256	1

5-4 The Estimation Results

The results presented in table (5-4) suggest that the significant Lagrange Multiplier (LM) test leads to the rejection of the null hypothesis that the cross-sectional variance components are zero ($H_0 : \sigma_v^2 = 0$), implying that there are individual and time specific factors affecting the estimation results and consequently making the OLS inefficient. Hence, the Panel analysis should be used to accommodate the unobserved effects of these specific factors on dependant variables. As (Gujarati, 2004) points out that Panel data can be estimated using either Fixed or

Random effect model. Discrimination between the two models can be made through the use of Hausman test. As signified by the significant Lagrange Multiplier (LM) and insignificant Hausman test, the random effects model which is generally estimated by the Generalized Least Square (GLS).

Table (5-4): The estimation results of study's model

	Fixed Effect Model	Random Effect Model
Constant	-0.1672 (0.826)	-1.5469 (0.320)
Int. Rate Risk	0.1147 (0.006)	0.1276 (0.000)
Credit Risk	2.4773 (0.317)	1.1869 (0.478)
Liquidity Risk	-0.1624 (0.346)	-0.0808 (0.684)
Market Risk	-0.0393 (0.039)	-0.0462 (0.023)
Bank Size	0.0076 (0.938)	0.1799 (0.347)
R2	0.5292	0.6899
F-statistic	12.19	36.92
Observations (n)	45	45

LM test	26.79 (0.000)
Hausman test / Chi2	0.78 (0.9786)

is found to be the preferred specification. Therefore, the discussion will be restricted to the model which has been found to be the best specification. To avoid misleading estimation results, the study uses a various diagnostic tests to make sure that the sample data fit the study model with no any statistical problems.

One of the problems facing the statistical estimation is the Multicollinearity, which results from the strong correlation between the dependant variables of the study. The presence of multicollinearity makes the estimation and hypothesis testing about individual coefficients in regression not possible (Gujarati, 2003). This is because multicollinearity makes the regression coefficients undefined or unstable and the standard errors for the coefficients wildly inflated, making these coefficients significantly not different from zero. Moreover, variables may be dropped from the regression, not because they have no effects, but because the sample is inadequate to isolate the effect precisely. The Variance Inflation Factor (VIF) was used for assessing multicollinearity problems. It shows the degree to which each independent variable is explained by other independent variables. As rule of thumb, a VIF greater than 10 indicates the presence of harmful

collinearity (Gujarati, 2003). The results of VIF show that the mean VIF for all the variables is 1.29, since the VIF for all variables are ranged between (1.07 – 1.43) which indicate the absence of the multicollinearity problem.

In addition, the study tests for the problem of heteroskedasticity or non-homogeneity of variance of the regression disturbances, using Breusch-Pagan test. The test is based on the use of Ordinary Least Square (OLS) residuals regression under the null hypothesis that the variance of the residuals is homogenous. The result of Breusch-Pagan test implies that the heteroskedasticity problem does exist for the sample of the study since the chi-square which is equal to 9.68 was statistically significant at 5%. To solve this problem we used the Robust Effect, thus we reject the null hypothesis that the variance of the residuals is homogenous.

The estimation results presented in table (5-4) shows that:

- There is a significant positive relationship between interest rate risk and banks gap management. This result is consistent with part (A) of the first hypothesis "There is a significant positive relationship ($\alpha \leq 0.05$) between interest rate risk and banks gap management". This result suggests that if the market interest rate level increase, the banks profits and returns increases, and vice versa. Moreover, it suggests that banks generate more profit from the increase in the market interest rate level than the interest paid by commercial

banks to depositors. The information on gap gives the management an idea about the effects on net income due to changes in the interest rate. This result is consistent with the findings of Duan and Sealey (1999), Elijah and others (2001) in USA and Tahtamouni (2001).

- There is no significant relationship between credit risk and banks gap management. This finding is not consistent with part (B) of the first hypothesis ”There is a significant positive relationship ($\alpha \leq 0.05$) between credit risk and banks gap management”, which means if there is increase or decrease in the credit risk, this will not effect the gap amount, thus, also will not effect the net interest income. This result is consistent with Tahtamouni (2001) result.
- There is no significant relationship between liquidity risk and banks gap management. Which means that any increase or decrease in the liquidity risk will not affect the gap management This result is not compatible with part (C) of the first hypothesis ”There is a significant positive relationship ($\alpha \leq 0.05$) between liquidity risk and banks gap management”. This result is similar to Tahtamouni (2001) study.
- There is a significant negative relationship between market risk and banks gap management. This finding is not consistent with part (D) of the first hypothesis ”There is a significant positive relationship ($\alpha \leq 0.05$) between market risk and banks gap management”. That is

mean if the market risk increases, the banks gap management decreases, and if the market risk decreases, the banks gap management increases.

- There is no significant relationship between banks size and banks gap management. This result is not compatible with second hypothesis ”There is a significant positive relationship ($\alpha \leq 0.05$) between banks size and banks gap management”. This is an explanation that Saudi commercial banks in spit of there size have good gap management and committed with Basil committee on bank supervision resolutions. This result comes similar to the study of Tahtamouni (2001).

Chapter Six

Conclusions and Recommendations

6-1 Introduction

The focus of this study has been the status of gap management in the Saudi commercial banks during the period 2006-2010. The study is constructed to achieve three objectives: firstly, find out whither there is a relationship between the gap management and the four main types of risk: (market risk, liquidity risk, credit risk and interest rate risk) in the Saudi commercial banks. Secondly, examine to what extent the bank size affects gap management in Saudi commercial banks and finally investigate the condition of each type of the four main risks (market risk, liquidity risk, credit risk and interest rate risk) in Saudi commercial banks.

This chapter aims to present the main conclusions of the study, in addition to some recommendations.

6-2 Research Conclusion

In this section of the study, a review and discussion of the significant findings for each objective are presented. The rationale is to ensure that the findings are accurate and relevant for the purposes of

the study. The findings gathered in this study are to achieve the objectives of the study, as follows:

1. **Find out whither there is a relationship between the gap management and the market risk in the Saudi commercial banks.**

There is a significant negative relationship between market risk and banks gap management. This result proposed that if the market risk increases, the banks gap management decreases, and if the market risk decreases, the banks gap management increases.

2. **Find out whither there is a relationship between the gap management and the liquidity risk in the Saudi commercial banks.**

There is no significant relationship between liquidity risk and banks gap management. This means that any increase or decrease in the liquidity risk will not affect the gap management.

3. **Find out whither there is a relationship between the gap management and the credit risk in the Saudi commercial banks.**

There is no significant relationship between credit risk and banks gap management. Which means if there is increase or decrease in the

credit risk, this will not affect the gap amount, thus, also will not affect the net interest income.

4. **Find out whither there is a relationship between the gap management and the interest rate risk in the Saudi commercial banks.**

There is a significant positive relationship between interest rate risk and banks gap management. This result suggests that if the market interest rate level increase, the banks profits and returns increases, and vice versa. Moreover, it suggests that banks generate more profit from the increase in the market interest rate level than the interest paid by commercial banks to depositors. The information on gap gives the management an idea about the effects on net income due to changes in the interest rate.

5. **Examine to what extent the bank size affects gap management in Saudi commercial banks.**

There is no significant relationship between banks size and banks gap management. This is an explanation that Saudi commercial banks in spit of there size have good gap management and committed with Basil committee on bank supervision resolutions.

6. **Investigate the condition of each type of the four main risks (market risk, liquidity risk, credit risk and interest rate risk) in Saudi commercial banks**.

From this study we found that the all Saudi commercial banks have positive beta (the measurement of market risk), which mean that these banks follow the market, in sense that they both tend to be above their respective averages together, or both tend to be below their respective averages together.

Through this study we found that the Saudi commercial banks are in good condition according to the liquidity risk where the mean of this risk is 13.6%. The Saudi Investment Bank has the highest percent of liquidity risk equal to 23.04%.

The Saudi commercial banks are in good conditions according to the credit risk, with mean of 0.5%. Bank al Bilad has the highest credit risk percentage equal to 0.94%.

From this study we found that half of the Saudi commercial banks have interest rate risk greater than 1, this means that there is a positive gap between sensitive rate assets and sensitive rate liabilities. And found that the other half of the Saudi commercial banks have interest rate risk less than 1, which means that there is a negative gap between sensitive rate assets and sensitive rate liabilities.

6-3 Research Recommendations

Based in results of the study, the study recommends the followings:

1. Saudi commercial banks should update the contents of their annual reports to include information about gap management, and maturities of sensitive rate assets and sensitive rate liabilities.
2. Saudi commercial banks must have adequate information systems for measuring, controlling and reporting interest rate exposure. Reports should be provided on a timely basis to the bank's board of directors, and senior management.
3. Saudi Arabian Monetary Agency (SAMA) should obtain from banks sufficient and timely information with which to evaluate their level of interest rate risk. This information should take appropriate account of the range of maturities in each banks portfolio.
4. The commercial banks in Saudi Arabia should match between liquidity, profitability and security to assure achieving the highest return from various investments in a way that not affect credit and liquidity risks, and within the gap between interest sensitive assets and interest sensitive liabilities.
5. Saudi commercial banks should develop training programs to their facilities about gap management concept and this will lead to better understanding of this concept of different management levels.

References

1. Ahmed, Abdulkader Mohamed, Khababa, Nourredine, (1999), "Performance of the Banking Sector in Saudi Arabia" *Journal of Financial management and Analysis*

2. Akhtaruzzaman, Md., (2009), "Potential Impact of Basel II in Developing Economics: Experiment on Bangladesh", *International Research Journal of Finance and Economics*

3. Alber, Nader, (2010), "The Effect of Banking Expansion on Profit Efficiency of Saudi Banks"

4. Annual Reports for the ten Saudi commercial banks, (2006 – 2010)

5. Armeanu, Dan, Balu, Florentina-Olivia & Obreja, Carmen, (2008), "Interest Rate Risk Management using Duration Gap Methodology"

6. Assaf, Albert, Barros, Carlos P. and Matousek, Roman, (2010), "Technical Efficiency in Saudi Arabian Banks", *Center for EMEA Banking, Finance & Economics*

7. Bank of Jamaica, (2005), "Interest Rate Risk Management" *Standards of Sound Business Practices*

8. Basel Committee on Banking Supervision, (2001), "Principles for the Management and Supervision of Interest Rate Risk", *Bank for International Settlements*

9. Basel Committee on Banking Supervision, (2003), "Sound Practices for the Management and Supervision of Operational Risk" *Bank for International Settlements*

10. Basel Committee on Banking Supervision, (2008), “Principles for Sound Liquidity Risk Management and Supervision”, *Bank for International Settlements*

11. Basel Committee on Banking Supervision, (2009), “History of the Basel Committee and its Membership” *Bank for International Settlements*

12. Beck, Kristine L., Goldreyer, Elizabeth F. & D’Antonio, Louis J. (2000), “Duration gap in the context of a bank’s strategic planning process” *Journal of Financial and Strategic Decisions*

13. Barth, James R., Nolle, Daniel E., Phumiwasana, Triphon & Yago, Glenn, (2002), “A Cross-Country Analysis of the Bank Supervisory Framework and Bank Performance” *Economic and Policy Analysis Working Paper*

14. Bessis, Joel, (2002), “Risk Management in Banking”, Second Edition

15. Bierwag, G. O., Kaufman, George G. (1985), “Duration Gap for Financial Institutoins“, *Financial Analysts Journal*

16. Bierwag, Gerald O., Kaufman, George G., (1992), “Duration Gaps with Futures and Swaps for Managing Interest Rate Risk at Depository Institutions”, *Journal of Financial Services Research 5:* 217-234

17. Brewer, Elijah, (1985), "Bank gap management and the use of financial futures", issue Mar, pages 12-22

18. Bruderl, Josef, (2005), “Panel Data Analysis”, University of Mannheim, P: 02.

19. Caouette, Jhon B., Altman, Edward I. and Narayanan, Paul, (1998), “Managing Credit Risk: The Next Great Financial Challenge”

20. Carling, Jacobson, Tor, Kenneth, Linde, Jesper & Roszbach, Kasper, (2006), “Corporate Credit Risk Modeling and the Macroeconomy” *Journal of Banking and Finance*

21. Diamond, Douglas W., Rajan, Raghuram G., (2005), “Liquidity Shortages and Banking Crises”, *The Journal of Finance,* Vol. LX No. 2

22. Duan, J., Sealey, C.W. & Yan Y., (1999), “Managing banks’ duration gaps when interest rates are stochastic and equity has limited liability”, *International Review of Economics & Finance*, Vol. 8 Issue 3, p253, 13p, 3 charts

23. Elijah, Brewer, Jackson, William, (2001), (Managing Interest Rate Risk”, *Journal of Finance,* Vol. 25, issue 3, P52

24. El-Quqa, Omar M., Dash, Shaliesh, Hasan, Faisal, Bhatt, Chandresh, Tripathy, Amit & Marfatia, Mihir J., (2006), “Saudi Arabia Banking Sector: Biggest beneficiary of the economic boom …”, *Global Investment House KSCC*

25. Entrop, Oliver, Memmel, Christoph, Wilkens, Marco & Zeisler, Alexander (2011) “Estimating the Interest Rate Risk of Banks Using Time Series of Accounting-Based Data”

26. Fooladi, Iraj, Roberts, Gordon S., (2004), “Macrohedging for Financial Institutions: Beyond Duration” *Journal of Applied Finance,* Vol. 14, No. 1

27. Ford, Neil, (2007), “Saudi Banking Goes International”, *Saudi Special*

28. Gaddam, Laxman, Abdul Malik, Syed, (2009), “Trends in Sector Wise Deployment of Credit by Commercial Banks in Saudi Arabia”

29. Goodhart, C. A. E., (2000), “The Organisational Structure of Banking Supervision”, *FSI Occasional Papers,* No. 1

30. Gorton, Gary, Winton, Andrew, (2002), "Financial Intermediation", *Wharton Financial Institutions Center-University of Pennsylvania*

31. Goyal, Krishn A., Agrawal, Sunita, (2010), "Risk Management in Indian Banks: Some Emerging Issues"

32. Gujarati, (2004), "Basic Econometrics", Fourth edition, *The McGraw-Hill Companies*

33. Haight, Timoth, G., (1997), "An overview of Risk management in bank", *Bankers magazine*, Vol. 180 issue 3, p10, 7p.

34. Al-Hamidy, Abdulrahman, (2010), "The global financial crisis: impact on Saudi Arabia" *BIS Meeting of Deputy Governors of Emerging Market Economies,* Basel, 28-29 January, 2010

35. Heffernan, Shelagh, (1996), "Modern Banking in Theory and Practice", p 163-193

36. Hempel, George H., Simonson Donald G., (1998), "Bank Management: Text and Cases", Fifth edition

37. Hogan, Arthur M. B., (1994), "Duration Gap as a Measure of Property/Casualty Insurer Interest Rate Risk"

38. Khan, Tariqullah, Ahmed, Habib, (2001), "Risk Management – An analysis of issues in Islamic financial industry", *Islamic Development Bank,* Jeddah-Saudi Arabia

39. Khnifer, Mohammed, (2011), "Exploring the Optimal Method of Penetration Into the Saudi Banking Sector" *Global Islamic Finance*

40. Kusy, M. I., Ziemba, W. T., (1986), "A Bank Asset and Liability Management Model", *Operation Research Society of America*

41. Lopez, Jose A., (2003), "Overview of the Basel Committee's Second Working Paper on Securitization" *Presentation of the San Francisco chapter of the Global Association of Risk Professionals*

42. Maracine, (2002) "Interest – Rate Risk Management Using Income Gap Analysis", *Economy Informatics*

43. Meyer, L., (2000) "Why Risk Management Is Important for Global Financial Institutions", *at the Risk Management of Financial Institutions United Nations Conference Center Bangkok, Thailand*.

44. Mishkin, S. Frederick (2000), "Financial Market and institution", Third edition, Wiley. P 619-635

45. Nawalkha, Sanjay K., Soto, Gloria M., (2009), "Managing Interest Rate Risk: The Next Challenge"

46. Nikolau, Kleopatra, (2009), "Liquidity (Risk) Concept: Definitions and Interactions", Working paper series, No 1008, *European Central Bank*

47. Noia, Carmine Di, Giorgio, Gorgio Di, (1999), "Should Banking Supervision and Monetary Policy Tasks Be Given to Different Agencies"

48. Pinheiro, Luis Vasco Lourenco, Ferreira, Miguel A., (2003), "How do Banks Manage Interest Rate Risk: Hedge or Bet?" *Journal of Banking & Finance*

49. Prasad, Chowdari, (2008), "Asset Liability Management in Banking"

50. Pyle, David H., (1997), “Bank Risk Management: Theory”, *Conference on Risk Management and Deregulation in Banking, Jerusalem,* May 17-19, 1997

51. Ramady, Mohamed A., (2010), “The Saudi Arabian Economy: Policies, Achievements and Challenges”, Second Edition

52. Raphavan, R.S., (2003), “Risk Management in Banks”, *Chartered Accountant*

53. Rose, P., Hudgins, S., (2008), “Bank Management & Financial Services”, 7th Edition, *McGraw-Hill / Irwin*

54. Santomero, Anthony M., (1997), “Commercial Bank Risk Management: an Analysis of the Process”, *Wharton Financial Institutions Center-University of Pennsylvania*

55. Sathye, M, Bartle, J, Vincent, M. & Boffey, R. (2003), “Credit Analysis & Lending Management”, *John Wiley & Sons*, Austeralia, Ltd.

56. Saudi Arabian Monetary Agency, (2006, 2007, 2008, 2009, 2010, 2011), Annual reports. Retrieved from the World Wide Web: www.sama.gov.sa

57. Saudi Arabian Monetary Agency, (n.d.) “Development and restructuring Saudi banking system”

58. Saudi Stock Exchange (Tadawul), (2006, 2007, 2008, 2009, 2010), Annual Reports, Retrieved from the World Wide Web: www.tadawul.com.sa

59. Shaffer, Sherrill, (1991), “Interest Rate Risk: What’s a Bank to Do?”, *Federal Reserve Bank of Philadelphia*

60. Shafiq, Afsheen, Nasr, Mohamed, (2010), "Risk Management Practices Followed by the Commercial Banks in Pakistan", *International Review of Business Research Papers,* Volume 6. Number 2. July 2010 Pp. 308-325

61. Simons, Katerina, (1995), "Interest Rate Derivatives and Asset-Liability Management by Commercial Banks", *New England Economic Review,* Vol 3. P17

62. State of Pakistan Bank, (2009), "Risk Management: Guidelines for Commercial Banks & DFIs"

63. Tahtamouni, Abla Said Soud, (2001), "Gap Management In The Jordanian Commercial banks (Empirical Study)", Master of Finance and Banking Thesis, *Yarouk University, Jordan*

64. Al-Tamimi, H., Al-Mazrooei, F., (2007), "Banks' Risk Management: A Comparison Study of UAE National and Foreign Banks", *the Journal of Risk Finance,* Vol. 8, Issue: 4, pp. 394 – 409

65. Toevs, Alden L., (1983), "Gao Management: Managing Interest Rate Risk in Banks and Thrifts" *Federal Reserve Bank of San Francisco – Spring 1983 Economic Review Number 2*

66. Treacy, William F., Carey, Mark, (2000), "Credit risk rating systems at large US banks", *Journal of Banking & Finance,* 167-201

67. Weston, A. (1983). "Managing Market Risk", Accountancy, Vol 106, issue 1163, p 118

68. Zurigat, Ziad, (2009), "Packing Order Theory, Trade-Off Theory and Determinants of Capital Structure; Empirical Evidence from Jordan", Thesis for degree of doctor of philosophy, *Heriot-Watt University, UK*

Appendices

Appendix A: Calculation of the Gap

Year	Bank	SRA SR'000	SRL SR'000	GAP SR'000	Relative IS GAP
2006	Albilad	124,274	6,894,772	-6,770,498	-0.60
2007		14,229	11,323,701	-11,309,472	-0.68
2008		12,169,132	9,434,824	2,734,308	0.17
2009		19,847	11,388,449	-11,368,602	-0.65
2010		1,823,969	14,341,338	-12,517,369	-0.59
2006	Arab National	54,380,561	51,474,186	2,906,375	0.04
2007		62,615,878	60,870,816	1,745,062	0.02
2008		77,602,054	80,602,308	-3,000,254	-0.02
2009		73,208,105	69,730,863	3,477,242	0.03
2010		67,910,866	71,236,381	-3,325,515	-0.03
2006	Aljazira	7,594,048	15,712,900	-8,118,852	-0.52
2007		13,542,004	14,147,756	-605,752	-0.03
2008		19,036,735	18,019,663	1,017,072	0.04
2009		22,740,077	21,304,848	1,435,229	0.05
2010		24,284,294	23,000,912	1,283,382	0.04
2006	Saudi	57,353,472	40,480,424	16,873,048	0.21

2007	Fransi	63,074,014	32,069,212	31,004,802	0.31
2008		85,289,399	55,179,765	30,109,634	0.24
2009		85,570,147	50,924,657	34,645,490	0.29
2010		86,713,832	45,731,758	40,982,074	0.33
2006	Saudi Hollandi	32,499,568	27,528,769	4,970,799	0.11
2007		32,826,473	24,639,350	8,187,123	0.16
2008		38,382,196	34,696,644	3,685,552	0.06
2009		36,181,905	36,042,934	138,971	0.00
2010		35,367,860	28,495,556	6,872,304	0.13
2006	Saudi Investment	26,990,457	30,120,742	-3,130,285	-0.08
2007		27,440,122	34,230,874	-6,790,752	-0.15
2008		37,727,633	40,424,257	-2,696,624	-0.05
2009		35,868,086	37,038,391	-1,170,305	-0.02
2010		39,909,770	36,031,816	3,877,954	0.08
2006	Al Rajhi	2,171,357	69,984,979	-67,813,622	-0.64
2007		1,700,563	78,495,460	-76,794,897	-0.61
2008		3,646,175	107,977,758	-104,331,583	-0.63
2009		126,433,529	104,966,721	21,466,808	0.13
2010		131,494,268	130,303,025	1,191,243	0.01
2006	Riyad	57,896,540	47,933,448	9,963,092	0.11
2007		71,508,830	57,756,968	13,751,862	0.11
2008		102,686,896	68,956,449	33,730,447	0.21
2009		115,219,075	80,795,032	34,424,043	0.20

2010		110,723,494	66,236,906	44,486,588	0.26
2006	SABB	45,659,962	46,370,247	-710,285	-0.01
2007		63,834,881	54,479,474	9,355,407	0.10
2008		86,585,579	78,145,647	8,439,932	0.06
2009		82,566,650	69,904,260	12,662,390	0.10
2010		81,512,328	59,221,827	22,290,501	0.18
2006	Samba	72,172,473	65,563,807	6,608,666	0.05
2007		82,876,286	87,718,570	-4,842,284	-0.03
2008		99,031,289	104,834,116	-5,802,827	-0.03
2009		87,654,566	112,540,446	-24,885,880	-0.13
2010		82,741,733	117,368,638	-34,626,905	-0.18

Appendix B: Calculation of the Types of Risk

Year	Bank	Interest Rate Risk	Credit Risk	Liquidity Risk
2006	Albilad	0.0180	N.A.	0.0211
2007		0.0013	0.0053	0.0219
2008		1.2898	0.0039	0.0240
2009		0.0017	0.0165	0.0207
2010		0.1272	0.0118	0.0179
2006	Arab National	1.0565	0.0008	0.0820
2007		1.0287	0.0005	0.1096

2008		0.9628	0.0004	0.1272
2009		1.0499	0.0039	0.1936
2010		0.9533	0.0073	0.1875
2006	Aljazira	0.4833	N.A.	0.0000
2007		0.9572	-0.0013	0.3706
2008		1.0564	0.0020	0.2506
2009		1.0674	0.0133	0.0367
2010		1.0558	0.0097	0.0691
2006	Saudi Fransi	1.4168	0.0009	0.0864
2007		1.9668	0.0004	0.1186
2008		1.5457	0.0006	0.0973
2009		1.6803	0.0037	0.0829
2010		1.8961	0.0021	0.0850
2006	Saudi Hollandi	1.1806	0.0066	0.0729
2007		1.3323	0.0090	0.1139
2008		1.1062	0.0003	0.0599
2009		1.0039	0.0159	0.0384
2010		1.2412	0.0055	0.0280
2006	Saudi Investment	0.8961	0.0023	0.3540
2007		0.8016	0.0021	0.4241
2008		0.9333	0.0005	0.2773
2009		0.9684	0.0086	0.2590
2010		1.1076	0.0119	0.1914

2006	Al Rajhi	0.0310	N.A.	0.0000
2007		0.0217	N.A.	0.0000
2008		0.0338	0.0044	0.0000
2009		1.2045	0.0059	0.0005
2010		1.0091	0.0079	0.0004
2006	Riyad	1.2079	0.0036	0.1260
2007		1.2381	0.0026	0.0806
2008		1.4892	0.0018	0.0963
2009		1.4261	0.0029	0.1063
2010		1.6716	0.0044	0.1112
2006	SABB	0.9847	0.0026	0.2152
2007		1.1717	0.0032	0.1098
2008		1.1080	0.0023	0.2245
2009		1.1811	0.0098	0.1856
2010		1.3764	0.0083	0.2285
2006	Samba	1.1008	0.0020	0.1322
2007		0.9448	0.0019	0.1986
2008		0.9446	0.0014	0.1318
2009		0.7789	0.0036	0.2072
2010		0.7050	0.0035	0.2919

Appendix C: Calculation of the Market Risk

Year	Bank	Covariance	Variance (Market)	Beta
2006	Albilad	0.01	0.02	0.4852
2007		0.01	0.01	1.2153
2008		0.01	0.01	1.2220
2009		0.00	0.01	0.3528
2010		0.00	0.00	0.3254
2006	Arab National	0.01	0.02	0.4799
2007		0.01	0.01	1.2032
2008		0.01	0.01	1.3010
2009		0.01	0.01	1.6301
2010		0.00	0.00	0.6376
2006	Aljazira	0.02	0.02	0.8247
2007		0.01	0.01	1.2700
2008		0.01	0.01	0.5427
2009		0.01	0.01	1.1837
2010		0.00	0.00	0.2837
2006	Saudi Fransi	0.01	0.02	0.5662
2007		0.01	0.01	1.3621
2008		0.01	0.01	0.6811
2009		0.00	0.01	0.0905
2010		0.00	0.00	0.5554

2006	Saudi Hollandi	0.01	0.02	0.4903
2007		0.01	0.01	1.4048
2008		0.01	0.01	0.9011
2009		0.01	0.01	1.0279
2010		0.00	0.00	0.1631
2006	Saudi Investment	0.01	0.02	0.7306
2007		0.01	0.01	1.4583
2008		0.01	0.01	1.0830
2009		0.01	0.01	1.3799
2010		0.00	0.00	-0.1517
2006	Al Rajhi	0.02	0.02	1.2178
2007		0.02	0.01	1.8299
2008		0.01	0.01	0.7952
2009		0.01	0.01	1.4736
2010		0.00	0.00	0.9429
2006	Riyad	0.01	0.02	0.4034
2007		0.01	0.01	0.9527
2008		0.01	0.01	0.6429
2009		0.01	0.01	0.9659
2010		0.00	0.00	0.5527
2006	SABB	0.01	0.02	0.5464
2007		0.01	0.01	0.6886
2008		0.00	0.01	0.0431

2009		0.00	0.01	0.7777
2010		0.00	0.00	0.6617
2006	Samba	0.00	0.02	-0.1006
2007		0.01	0.01	0.9426
2008		0.01	0.01	1.1206
2009		0.01	0.01	1.7594
2010		0.00	0.00	0.7447

Bank	Variance (Market)
Albilad	0.78
Arab National	1.14
Aljazira	1.04
Saudi Fransi	0.78
Saudi Hollandi	0.86
Saudi Investment	1.11
Al Rajhi	1.30
Riyad	0.88
SABB	0.64
Samba	0.83
Mean	**0.94**
Standard Deviation	**0.20**

Appendix D: Calculation of the Banks Size

Year	Bank	Total Assets SR'000	Log Total Assets
2006	Albilad	11,281,364	7.0524
2007		16,635,838	7.2210
2008		16,051,789	7.2055
2009		17,411,192	7.2408
2010		21,116,686	7.3246
2006	Arab National	78,035,383	7.8923
2007		94,467,561	7.9753
2008		121,307,142	8.0839
2009		110,297,320	8.0426
2010		116,034,765	8.0646
2006	Aljazira	15,712,900	7.1963
2007		21,563,988	7.3337
2008		27,519,705	7.4396
2009		29,976,604	7.4768
2010		33,018,221	7.5188
2006	Saudi Fransi	79,581,010	7.9008
2007		99,808,110	7.9992
2008		125,864,761	8.0999
2009		120,572,438	8.0812
2010		123,218,330	8.0907

2006	Saudi Hollandi	46,740,064	7.6697
2007		50,411,314	7.7025
2008		61,436,183	7.7884
2009		59,109,718	7.7717
2010		53,882,413	7.7314
2006	Saudi Investment	40,844,623	7.6111
2007		46,541,793	7.6678
2008		53,596,364	7.7291
2009		50,148,011	7.7003
2010		51,491,233	7.7117
2006	Al Rajhi	105,208,744	8.0221
2007		124,886,482	8.0965
2008		164,929,801	8.2173
2009		170,729,729	8.2323
2010		184,840,910	8.2668
2006	Riyad	94,015,845	7.9732
2007		121,350,825	8.0840
2008		159,652,525	8.2032
2009		176,399,258	8.2465
2010		173,556,430	8.2394
2006	SABB	77,189,378	7.8876
2007		98,212,910	7.9922
2008		131,660,693	8.1195

2009		126,837,962	8.1032
2010		125,372,866	8.0982
2006	Samba	124,014,813	8.0935
2007		154,413,974	8.1887
2008		178,891,190	8.2526
2009		185,518,269	8.2684
2010		187,415,840	8.2728

ملخص الدراسة

البوعلي ، محمود إبراهيم. إدارة الفجوة في البنوك التجارية: حالة دراسية عن المملكة العربية السعودية. رسالة ماجستير بجامعة اليرموك. 2012 (المشرفين: د. منى المولا ، د. زياد زريقات).

تعتبر إدارة الفجوة من أهم تقنيات إدارة المخاطر في البنوك التجارية ، وقد لاقت إدارة الفجوة اهتماما وتركيزا أكبر خلال العقد الماضي عما كانت عليه بسبب إزدياد تقلبات أسعار الفائدة. وتأتي أهمية هذه الدراسة من أهمية قطاع البنوك التجارية بشكل عام وأهمية إدارة المخاطر فيها بشكل خاص. وتهدف هذه الدراسة بشكل رئيسي إلى إختبار العلاقة بين الأربعة أنواع الرئيسية من المخاطر في البنوك التجارية: (مخاطر أسعار الفائدة ، مخاطر الإئتمان ، مخاطر السيولة ، مخاطر السوق) بالإضافة إلى أثر حجم البنك على إدارة الفجوة في البنوك التجارية السعودية. كذلك هدفت هذه الدراسة إلى التعرف على مدى وجود فروقات ذات دلالة إحصائية بين إدارة الفجوة من جهة ومخاطر أسعار الفائدة ومخاطر الإئتمان ومخاطر السيولة ومخاطر السوق وحجم البنك من جهة أخرى.

تكونت عينة الدراسة من عشرة بنوك تجارية مدرجة في السوق المالية السعودية وقد تم جمع البيانات من التقارير السنوية لهذه البنوك خلال الفترة من 2006 إلى 2010 وأيضا من خلال التقارير الصادرة عن مؤسسة النقد العربي السعودي والسوق المالية السعودية.

وقد أظهرت نتائج هذه الدراسة وجود فروقات ذات دلالة إحصائية وبالتالي وجود علاقة إرتباط إيجابية بين إدارة الفجوة ومخاطر أسعار الفائدة ، كذلك أظهرت وجود علاقة إرتباط سلبية بين إدرة الفجوة ومخاطر السوق. ولم تظهر النتائج وجود أي فروقات ذات دلالة إحصائية بين إدارة الفجوة وكل من مخاطر السيولة ومخاطر الإئتمان وكذلك حجم البنك.

وأخيرا فإن أهم التوصيات التي اقترحتها هذه الدراسة تمثلت في ضرورة تطوير محتوى التقارير السنوية للبنوك السعودية لتحتوي على معلومات حول فترات الإستحقاق للموجودات والمطلوبات الحساسة للتغير في أسعار الفائدة والمتعلقة بإدارة الفجوة ، وأيضا إيجاد نظام لقياس مخاطر أسعار الفائدة بحيث يكون قادر على الإلمام بمصادر هذا النوع م المخاطر وقياس أثره على نشاط البنوك.

الكلمات المفتاحية: إدارة الفجوة ، إدارة مخاطر البنوك ، مخاطر أسعار الفائدة ، مخاطر الإئتمان ، مخاطر السيولة ، مخاطر السوق ، البنوك في المملكة العربية السعودية ، مؤسسة النقد العربي السعودي.